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ABSTRACT

This publication presents case studies of school buildings to demonstrate the application of a post occupancy evaluation (POE) during various stages of the design and planning process. It explains that because POE is a process for gathering information about a building in use, it can be applied effectively both to renovation and expansion projects and to new construction. The case studies were selected because each addresses community and user participation as an integral part of the school planning process. In Jamestown, North Carolina's Millis Road Elementary School addition, the initial application of a POE using a school building assessment survey provided information about the school's performance that helped inform the architect about existing conditions and the needed improvements desired in the new classroom addition. The Davidson Elementary School project in Davidson, North Carolina linked all stages of the school building process, from user participation in the development of the program to the evolving design solution, and a building evaluation after completion. The Centennial Campus Middle School in Raleigh, North Carolina began with a vision shared by university educators and county school officials about the creation of schools within a school. Finally, the Rosa Parks Elementary School in Berkeley, California (formerly the Columbus School) demonstrated a participatory process that included parents, teachers, children, and community members who initiated and passed a bond measure to rebuild the earthquake-damaged school. The case studies include building plans and photographs. Appendices contain a six-factor school building checklist, a school building rating scale, an inclusive school building assessment checklist, and a classroom arrangement rating scale. (Contains 27 references.) (EV)

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Schools Designed with Community Participation

Henry Sanoff AIA

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Schools Designed with Community Participation

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Introduction

The physical form of American schools began in the 19th century with the one-room schoolhouse (Gulliford, 1984). The image of the schoolhouse was suggested by its name: a single-story volume under a gabled roof. The structure's simple rectangular plan featured a centered doorway often crowned with a bell tower. The teacher's desk sat opposite the door, facing students, backed by a chalkboard. Windows in rows along either sidewall provided natural lighting and cross-ventilation.

This typical schoolhouse layout suggested the behavior of the educational activity within. The teacher, as the dispenser of knowledge, assumed the focus. No students worked in groups around clustered tables here. Columns and rows of desks defined a lecture/listen approach, with the desk arrangement focusing attention on the teacher and deterring students from other forms of interaction.

In the United Sates, schools grew in size as communities grew, but from 1900 to 1950 the classroom underwent very little change (Spring, 1993). Larger school buildings arranged the typical one-room schoolhouse classroom into linear rows along corridors and other school amenities, such as libraries and auditoriums, were added. Even as a new understanding of learning and teaching methods was developing, however, the classroom remained essentially unchanged.

This monolithic classroom with its rows of desks became so canonized that an entire industry of school furniture was created. Specific grades had a schedule specifying the proper quantity and size of furniture required, contributing to classrooms' dull consistency. During this period, you could travel to almost any school throughout America and find similar classroom environments.

The late 60s and early 70s was the era of the open classroom, the first significant classroom development since the modern school was invented (Barth, 1972). Educational theories on understanding how children learned suggested that the school environment should promote social interaction at various levels. Eliminating individual classrooms, the open classroom design sought to let students freely migrate into small working groups and participate in different learning activities. It allowed teachers, normally isolated from one another, to interact. The open classroom school intended to bring the school community together, but it failed, and many open classroom school buildings still in use today have undergone extensive renovation to return to traditional classroom designs. Open classrooms' failure was not caused by misplaced motivations, since design ideas that unify school com-

munities are still sought. Rather, the open classroom school failed to recognize the disorder caused by visual distraction and noise, and the territorial need for boundaries (Gump, 1987).

The Learning Environment

One hundred and fifty years ago, classrooms represented a common teaching method. Today teaching methods have changed but, often, the design of the classroom has remained static. An examination of current learning styles and teaching methods suggests a new form of learning environment characterized by different activity settings and small group activities.

In order to experience healthy development, students require certain needs to be met. Schoolagers require diversity, which entails different opportunities for learning and different relationships with a variety of people (Levin & Nolan, 2000). In a school that responds to its students' need for diversity, one would not find students all doing the same thing, at the same time, in similar rooms. One would not expect to see students sitting in neat rows of desks, all facing teachers who are lecturing or reading from textbooks. Instead, in responsive schools, students and teachers would be engaged in different learning activities in and out of the classroom. A variety of teaching methods including small group work, lectures, learning by doing, individualized assignments, and learning centers, would be used (Jacob, 1999).

While the school curriculum describes the intended courses-of-study, activities, and outcomes, much learning takes place outside the formal curriculum. Educators describe this idea as incidental learning, which derives from many sources, one of which is the physical environment of the school.

It is not hard to grasp the idea that a school building can and should promote and even exemplify the idea that exploring and discovery is an important part of obtaining knowledge. Activities within schools have educational and social aspects, and both are an important part of school life; it is not only the teaching spaces that serve to deliver the curriculum, but those places where students spend free time, and these too should receive attention.

People are becoming more aware that social areas in schools are important (Baum & Valins, 1977). This concept goes beyond the traditional requirements of rooms in which students and teachers can meet and eat, and it stems from the view that an overall atmosphere should be created to help students identify with and feel ownership of, the environment in which they study and play. Social space should provide places for quiet contemplation and formal and informal play

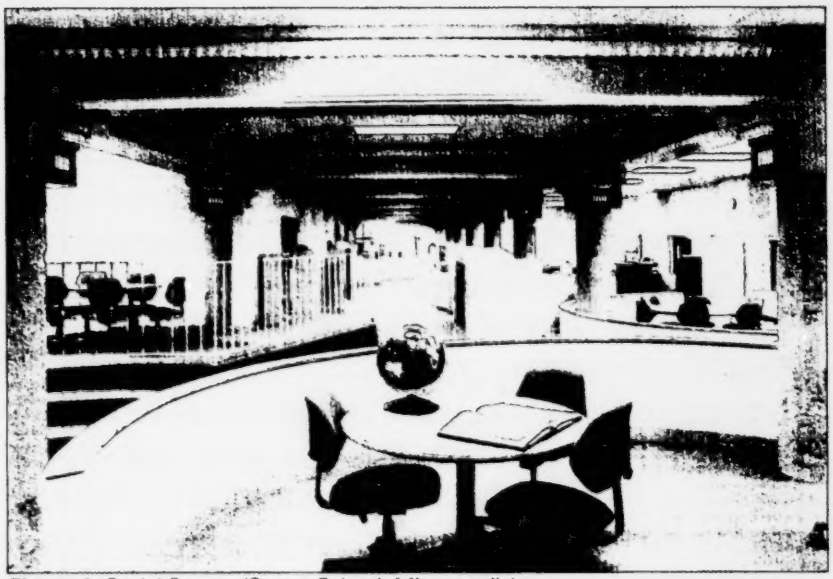


Figure 1: Social Space: *(Saturn School, Minneapolis)*

(Figure 1). A variety of places are needed both inside and outside the school where children can meet together in groups, sometimes small, sometimes large. Such places need the physical characteristics that convey welcome and promote the feeling of belonging and of ownership.

Buildings and spaces convey messages reflecting the inner life, activities, and social values of the users. Characteristics like shape, color, or arrangement help building users make vividly identified mental images of the environment (Sanoff, 1994). People read these messages, make judgements, and act accordingly. Thus, specific environments can be evaluated according to the different interpretations of the messages conveyed.

• A school as a functional environment can be evaluated according to how efficiently and flexibly space is organized, and how spaces facilitate adaptation to different uses, groups of users, particularly the needs of adults and children with physical handicaps. These are not simply technical issues; they should be considered relative to the need for different types of social environments.

• A school as a learning environment can be evaluated by how well spaces foster the social and psychological conditions in which learning is most likely to be successful.

• A school as a visual object can be evaluated along an aesthetic dimension. It can be stimulating both in terms of its intrinsic design and its use.

• A school as a part of its wider environment can be evaluated by how successful it has enhanced its history and traditions as an institution, and whether it creates harmony with the local ecology and complements the surrounding physical environment.

At a regional CEFPI conference, Jeff Lackney (1999) summarized several research based design considerations that are fundamental in developing a school building assessment program. They include places for group learning, personalized space, spatial variety, active/passive places, linking indoor and outdoor places (Figure 2), public space (Figure 3), stimulating environments, safety, flexibility and the community as a learning environment:

The school environment affects students and teacher's health, work, leisure, emotions, and a sense of place and belonging. When the school environment works well students' lives and educational performance are enhanced. While the school environment is intended to support students' individual needs, it is necessary to gain knowledge about their diverse needs and how the physical environment satisfies them.

There has been an expressed need by citizens, educators, elected and appointed officials, and architects for guidance in assessing K-12 schools. This need has been, in part, an outgrowth of reports of increased violence, dropouts, and youth unemployment. Quite often decisions need to be made about the closing of schools or school conversions, expansions, and renovations, yet there are few effective tools available for examining school quality. With the aid of assessment surveys and checklists, teachers, citizens groups, and policy makers can be guided through a procedure for interviewing, observing, and discussing ways and means for making schools more responsive to the developmental needs of adolescents and teens.

Evaluation is a systematic assessment of environmental performance relative to defined objectives and requirements. The assessment process is a means of providing satisfactory environments for the people who own, manage, and occupy them. A post occupancy evaluation (POE) is an assessment process that can be applied to any type or size of school environment. The type of POE utilized for a particular situation is a function of the amount of time available, the resources, and the depth of knowledge necessary.

Checklists and surveys used by students, educators, parents, citizens, and policy makers are tools for observing and assessing, and making decisions regarding the future of schools. A school assessment program has many possible uses by staff (in accreditation self-study), school boards, citizens councils, and parent-teacher organizations for the assessment of K-12 school quality, and most important, as a component for an evaluation designed to precede modifications to the school facility.

In addition to checklists, observations are required of the physical facilities, where such items as places for socialization, spatial flexibility, and opportunities for students to personalize their school provide a more comprehensive understanding of the school environment. Observations of the classroom center on the ability for students to direct their own studies and modify the classroom to suit their needs.

Case studies of school buildings are described in this publication to demonstrate the application of a POE during various stages of the design and planning process. Since POE is a process for gathering information about a building in use, it can be applied effectively to renovation and expansion projects as well as to new construction. The

Figure 2: Outdoor places linked with indoors *(Silverado Middle School, Roseville, CA)*

Figure 3: Corridors as public spaces *(Centennial Campus Middle School, Raleigh, NC)*

case studies here in were selected because they each address community and user participation as an integral part of the school planning process.

• In the Millis Elementary school addition, the initial application of a POE using a school building assessment survey provided information about the school's performance that helped inform the architect about existing conditions and the needed improvements desired in the new classroom addition. Workshops with students, teachers, and parents helped to further identify their aspirations and strengthen their sense of school community.

•The Davidson Elementary school project links all stages of the school building process, from user participation in the development of the program to the evolving design solution, and a building evaluation after completion. Although this project required several visits after construction to complete, the knowledge gained from the POE reinforced the effectiveness of the participation process in improving the quality of education. The Davidson School won an Honor Award and a Post-Occupancy Evaluation Award from the School Construction News and Design Share Awards Program in 2000. This case study is

an expansion of the version that appeared in *Community Participation Methods in Design and Planning*, by Henry Sanoff, published by John Wiley and Sons.

•The Centennial Campus Middle school began with a vision shared by university educators and county school offcials in the creation of schools within a school. Centennial school resulted from a lengthy collaborative process between the Wake County Public School System and North Carolina State University. The building is a 600-student middle school that includes three academic houses. A POE conducted from the students' and teachers' viewpoint after one year of occupancy reveals elements of the vision that succeeded and others that were less successful.

•The Rosa Parks elementary school demonstrates a participatory process that included parents, teachers, children, and community members who initiated and passed a bond measure to rebuild the earthquake-damaged school. Central to their vision was to establish a community school designed not only to educate but also to strengthen families and build community through a variety of programs. The emerging interest in creating schools that are less restrictive for students with visual and hearing impairments as well as physical and mental disabilities prompted a study of the Rosa Parks school. After three years of occupancy, teachers were surveyed to assess the effectiveness of this school in meeting the accessibility needs of its diverse users.

Participation in a Classroom Addition

Overview

Architects
Adams Group Architects

Planning Partners
Henry Sanoff
Celen Pasalar
Mine Hashas
Jianxin Hu

Introduction

This is a case study of a classroom addition to the Millis Road Elementary School in Jamestown, North Carolina. It describes a process of collaborative teamwork among people with different backgrounds and roles and how they worked together to achieve an innovative and widely accepted plan for the school's alteration and expansion. Through the use of a survey, a walking tour checklist, and a three-day workshop, the project's design team guided students, teachers, and parents in evaluating their existing school, describing their preferences for a new learning environment, and selecting a satisfactory design solution.

Education has always been an important subject in the United States, but today the condition of the educational infrastructure and its ability to meet current learning demands has become a national concern. Many of America's schools are worn out and unable to host current technologies. School classrooms are often unable to support specific courses or teaching methods (Lackney,1994). Schools with inadequate ventilation can make students drowsy and lower their performance. Classrooms with poor acoustics and visual distractions can divert attention from the best-prepared lesson plans. Congested hallways can fuel student tensions. Drab interiors, poor lighting, and the lack of pleasant social gathering spots make school less than inviting as a place to work and learn.

A strong facility planning process can help avoid these and other problems. School and community pride as well as faculty morale are raised when the planning process invokes the right questions, includes the right stakeholders, and establishes a clear sense of purpose.

Today there is a strong movement towards the involvement of school community members in defining their school environment. The participation of building users can occur throughout the planning process, using the direct involvement of teachers and students to design learning spaces (Sanoff, 2000).

Participatory workshops that bring people together for collaborative work have become a useful way to mount a new professional approach to school design. Workshops let people share their ideas in small groups amongst themselves (Figure 1). According to Forester (1999), "Participation processes may enable participants to learn not only from arguments about possibilities, but from all multiple issues, alternatives, concerns, and conflicts related to their experiences that they discuss with each other. The participation processes encourage people to

Figure 1: Small group work sessions

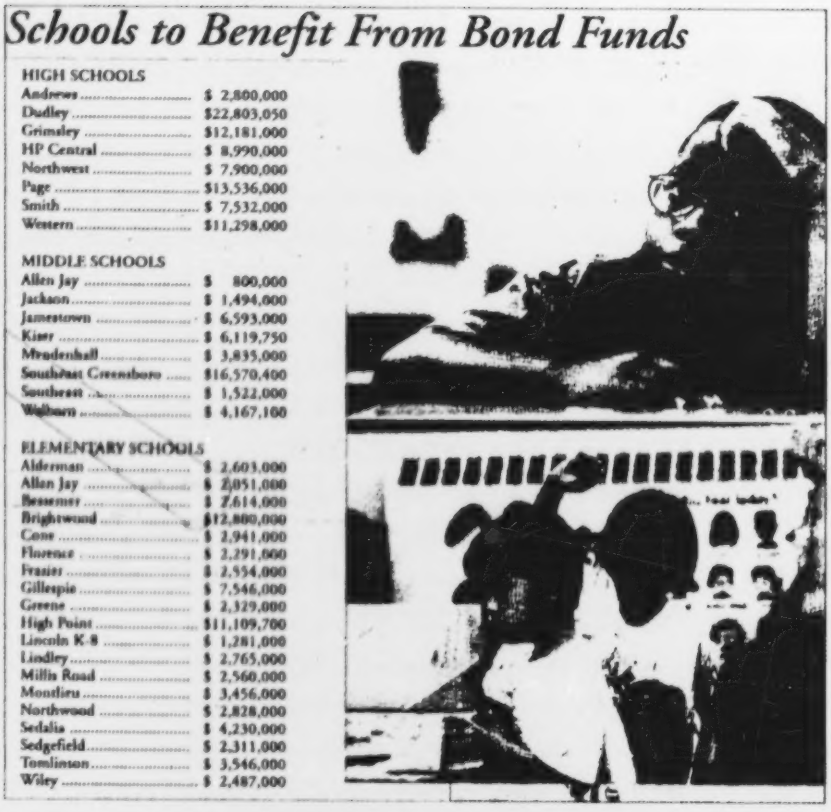
learn from each other; it reminds them of their own concerns; it brings into focus values they have and obligations they wish to emphasize or interests they wish to satisfy – even if they did not foresee this at the beginning of a workshop."

Case studies, as a documentation of the sequence of stages that occur in a participatory proces, help us understand how people organize and perceive the situations they are in and how they begin to act on the problems they face. They are helpful in making practical claims about what appears to work well or poorly, what is considered reliable or not, and what is to be taken as important, noteworthy, and worth time and attention. Malecha (2001) says that case studies explore concepts related to the integration of ideas and information such as interrelated decisions, teams, user and client groups and program demands. This case study of the Millis Elementary School renovation and classroom describes the participatory process and the results it produces.

The Millis Road Elementary School

The Guilford County, North Carolina, school district is not unlike many others. The majority of its schools were constructed between 1960 and 1970 and are in need of repair and expansion. With visionary leadership, the county's board of education developed a plan and timeline for assessing and revitalizing its aging building stock. The board also committed the district to an annual facility evaluation of its schools believing that frequent feedback would spur additional efforts to succeed (George, Weast, Jones, Priddy & Allred, 2000).

After voter approval of a new school bond, Guilford County approved 35 new school projects and alllocated $2,600,000 to the Millis Road Elementary School for the construction of five additional classrooms (Figure 2).



Schools to Benefit From Bond Funds

HIGH SCHOOLS

Andrews	$ 2,800,000
Dudley	$22,803,050
Grimsley	$12,181,000
HP Central	$ 8,990,000
Northwest	$ 7,900,000
Page	$13,536,000
Smith	$ 7,532,000
Western	$11,298,000

MIDDLE SCHOOLS

Allen Jay	$ 800,000
Jackson	$ 1,494,600
Jamestown	$ 6,593,000
Kiser	$ 6,119,750
Mendenhall	$ 3,835,000
Southeast Greensboro	$16,570,400
Southeast	$ 1,522,000
Welborn	$ 4,167,100

ELEMENTARY SCHOOLS

Alderman	$ 2,603,000
Allen Jay	$ 2,051,000
Bessemer	$ 2,614,000
Brightwood	$12,800,000
Cone	$ 2,941,000
Florence	$ 2,291,600
Frazier	$ 2,554,000
Gillespie	$ 7,546,000
Greene	$ 2,329,000
High Point	$11,109,700
Lincoln K-8	$ 1,281,000
Lindley	$ 2,765,000
Millis Road	$ 2,560,000
Montlieu	$ 3,456,000
Northwood	$ 2,828,000
Sedalia	$ 4,230,000
Sedgefield	$ 2,311,000
Tomlinson	$ 3,546,000
Wiley	$ 2,487,000

Figure 2: School bond approved for 35 new schools in Guilford County

Millis Road Elementary School opened in 1961 with an enrollment of 360 students, 12 teachers, and a principal (Figure 3). The school is located on a 15-acre tract surrounded by High Point and Vickory Streets and shares land with Jamestown Middle School and Ragsdale High School. Millis was built to relieve overcrowding in the Jamestown district and originally designed for a capacity of 560 students.

Besides the construction of five new classrooms (including self-contained space for exceptional children), the Millis Road Elementary School project includes upgrading technology, providing furniture and equipment for new classrooms, adding resource rooms, renovating the kitchen and it's equipment, and adding additional parking.

To ensure the highest quality school addition, the Guilford County Facility Center Board interviewed several experienced architectural

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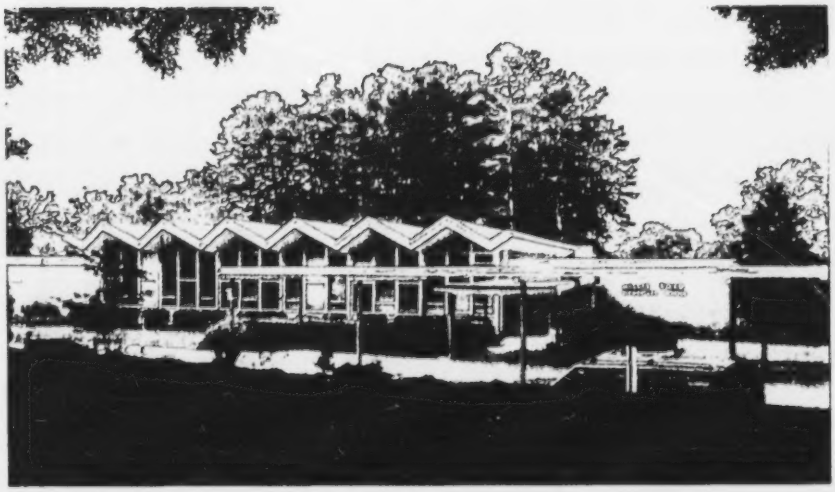

Figure 3: Millis Road Elementary School

firms and selected the Adams Group Architects on the basis of its qualifications and past successes in school design.

The Survey

To fulfill the County's elementary school revitalization plan, the Millis Road Elementary School principal and the teaching staff agreed to participate in the design process led by Henry Sanoff, a consultant to the Adams Group Architects. Together, Sanoff and the architects (the "design team"), prepared an intensive, three-day series of workshops at the Millis School to underscore the importance of having school community members participate in the design process and demonstrate how the results of the workshops could successfully influence the design of the new addition. The workshop's intensive nature was meant to foster a high level of energy and interest from the community and encourage students and teachers to interact continuously with the design team.

Prior to the workshop, teachers and students were asked to evaluate the present school using the *School Building Rating Scale*, (see Appendix B), a comprehensive assessment tool used to gather information about current conditions and users' expectations. Although major modifications to the existing building were not planned, the survey was used to involve the school community in identifying the positive and negative features of the present school as a starting point for planning the school addition.

The survey posed fifty-six questions organized into several categories, including physical features, outdoor areas, learning environments, social areas, media access, transition spaces and circulation routes, visual appearance, and safety and security. The survey findings indicated that teachers were more satisfied than students with the physical conditions of the school building, while students were critical of the building's appearance and scale (Figure 4). The findings also revealed that both teachers and students were concerned about the lack of physical accessibility between indoor and outdoor areas. Teachers noted the limited areas for learning outdoors and wanted play areas to foster greater social interaction among students (Figure 5). Although no present classrooms offered direct access to the outdoors, outdoor learning areas were available adjacent to the school.

The present classrooms were generally considered comfortable but insufficiently flexible and incapable of offering separate spaces for multipe learning activities. Teachers and students also said that there was inadequate display space in classrooms and hallways. Although both groups wanted more private places for students, teachers expressed a desire to have private workspaces closer to their classrooms (Figure 6). These and other insights revealed in this survey provided useful background information for the design team.

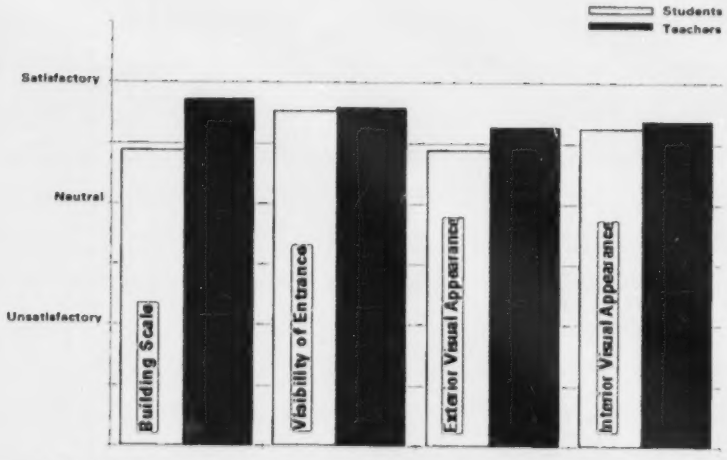

Figure 4: Students' and teachers' comments about visual appearance

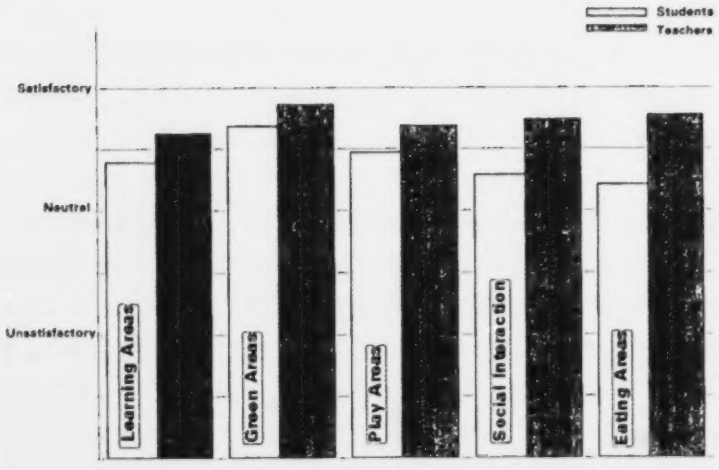

Figure 5: Students' and teachers' comments about outdoor areas

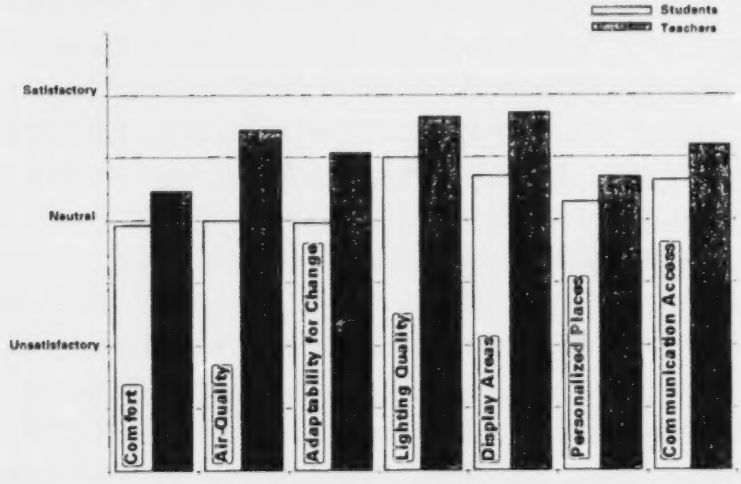

Figure 6: Students' and teachers' comments about learning environments

The Teacher's Three-Day Workshop

Because the most important part of the school project was the classroom addition, the first day of the workshop focused on the classroom. The 50 or so teachers who attended were provided with drawings of six different classroom arrangements developed from a study of classrooms by the design team, with each arrangement drawn at the same scale. Attendees were organized into four-person groups to encourage discussion and idea sharing (Figure 7). They evaluated the classroom arrangements according to eleven criteria (Appendix D).

Figure 7: Teachers working in small groups comparing classroom alternatives

Among their comments, the teachers said they needed to use outdoor areas for teaching activities, and they wanted these areas to be directly accessible from their classrooms. They thought about which classroom arrangement provided sufficient teacher workspace, which classrooms could be used for flexible teaching activities, and which classrooms had sufficient storage space for students and teachers. They wanted classrooms to have good outdoor views and daylighting and identified those classroom arrangements allowing for a variety of learning opportunities.

AFTER CONSIDERABLE DISCUSSION, THEY SELECTED THE "L-SHAPE" CLASSROOM ARRANGEMENT AS PROVIDING THE MOST FLEXIBILITY. THE L-SHAPE WAS ALSO JUDGED BEST FOR ALLOWING A VARIETY OF TEACHING METHODS INCLUDING TEAM TEACHING, AND ENCOURAGING SMALL-GROUPS TO WORK INDEPENDENTLY.

Later in the day, the teachers took a walking tour of the school building and grounds using the *Six Factor School Building Checklist* (see Appendix A). This assessment tool helped increase their awareness of the school environment by making them rate physical factors on a checklist. It also prepared them to consider alternative locations for the new classroom addition.

The checklist contains six factors — context, massing, interface, wayfinding, social space and comfort. These are rated on a seven-point scale from very unsatisfactory (VU) to very satisfactory (VS). Overall, the teachers' assessment indicated that they were satisfied with the school's scale and surroundings but were less satisfied with its massing and site layout. They also found the school's interior and exterior to be poorly connected, and they noted the inadequacy of the routes, pathways, passageways, and streets in and around the building.

The teachers rated the school's classrooms unsatisfactory for their inability to provide adequate space for small group meetings and projects and for their impersonal workspaces, their lack of privacy, and their lack of display (Figure 8). They wanted more storage and private workspaces for themselves and students. They also gave unsatisfactory ratings to the environmental conditions throughout the school.

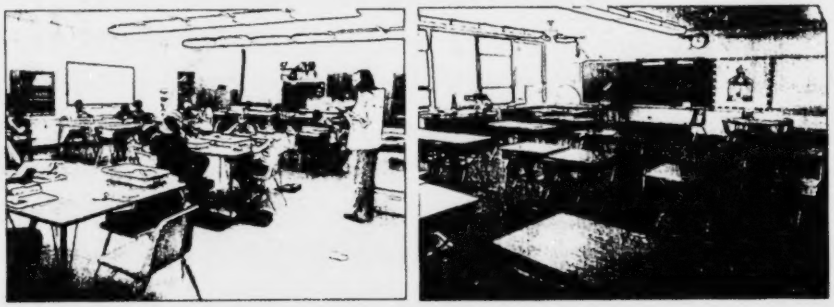

Figure 8: Existing classrooms in the Millis Elementary School

On the second day of the workshop, the design team prepared two alternative design schemes based on results from the survey, the teachers' assessment, and their own observations about the school building and its surroundings. Both schemes provided for the team teaching opportunities suggested by the teachers.

The team also explored solutions for parking and traffic problems that occur every morning and afternoon on school days (Figure 9). Unsafe conditions were created as some students boarded buses parked outside the main entrance, while others were met by parents in cars that were often were backed up behind the buses to the High Point and Vickory Road intersection. The design team therefore proposed separate pick up areas for buses and parents. Another design goal was to provide direct access to the bus loading area from the school. This was achieved by proposing a new main hallway from the existing building to the new addition.

Plan A (Figure 10) connects the new addition to the existing building by a hallway with direct access to the new classrooms. The classrooms are L-shaped and face south, which provides the highest levels of daylight while offering direct access to the outdoors.

Plan B (Figure 11) provides L-shaped classrooms aligned on a diagonal hallway with resource rooms at the far end. It includes a wide hallway that connects the existing building to the new classrooms and to the bus

Figure 9: Bus loading and parking areas

loading area. The hallway configuration provides additional space in front of the classrooms for displaying student work. The classrooms face south and have direct access to the outdoors.

On the third day, the design team refined the two design schemes and prepared three-dimensional computer models and plan views of the entire site for an afternoon workshop that was attended by almost 40 teachers. They again formed into groups of four to encourage discussion and idea sharing.

Two schemes were presented with the following criteria for their evaluation.

- Safe outdoor environment
- Visual appearance of the new additional classrooms
- Transition spaces inside and outside the additional building
- Relationship of classrooms in the additional building
- Harmony of the additional building with surroundings
- Student and teacher friendly classrooms
- Interesting variation in the addition massing

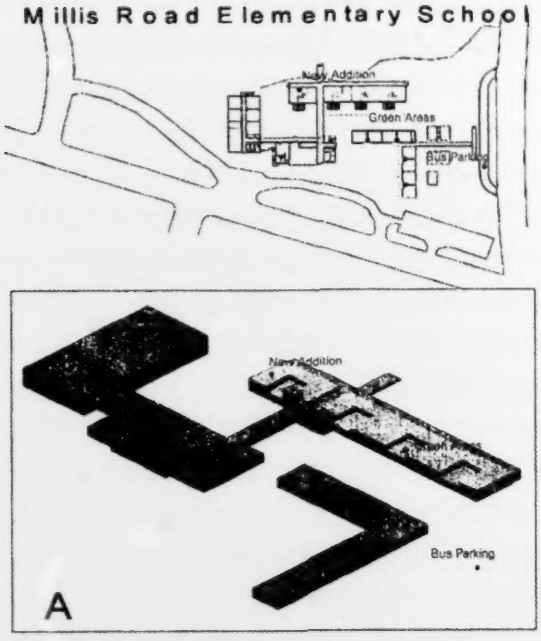

Figure 10: Plan A

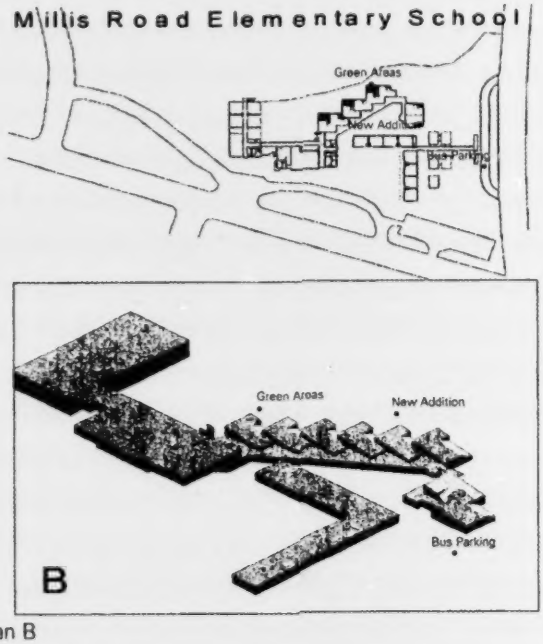

Figure 11: Plan B

By comparing and rating the plans with these criteria, the teachers used concepts they had acquired on the first day of the workshop when they discussed such issues as harmony, massing, and spatial relationships.

The teachers unanimously preferred Plan B. They liked the unusual shape of the adition and how it connected to the existing school building. They thought the diagonal arrangement of the classrooms allowed for a less formal corridor and liked that it provided alcoves for tutoring. They also felt that the less formal classroom plan would be more student- and teacher-friendly. Massing was discussed from the viewpoint that Plan B's overall shape appeared to grow out of the existing school building, while harmony with the surroundings meant less disturbance to the existing outdoor environment. Generally, teachers envisioned Plan B as an extension of the existing building compared to the obvious "addition" represented in Plan A.

Considering the increased numbers of students the classroom addition would bring, the teachers were concerned about the adequacy of the of the hallway for providing access from the existing building through the new addition to the bus-loading area, but they felt that the proposed location for the bus-loading area would help relieve the traffic congestion during drop-off and pick-up periods.

From the workshop, the design team learned how the teachers thought their present building functioned and what its key problems were. Teachers were effective in evaluating and accepting innovative classroom and building designs and they willingly accepted new ideas that were beyond their everyday experiences, but they were less able to creatively plan their own classroom layouts. The teachers commented that this was the first time they had ever been asked to contribute their knowledge and experience to the design process.

Parents Meeting

Following the three-day teachers' workshop, the design team shared its findings with approximately 150 parents during a monthly Parent, Teacher, Student Association (PTSA) meeting. The parents questioned the teachers' ability to adapt to the L-shaped classrooms, an obvious departure from traditional layouts. The teachers defended their decision by pointing out the opportunities the L-shape plans gave students to work independently and in small groups.

The parents also recommended finding another location for the administrative offices, which were situated at the intersection of the planned addition. They felt that relocating the offices would provide a wider hall

way to accommodate the increased traffic created by the new addition. The architects were asked, and agreed to consider how the new administrative functions could be accommodated within the existing building shell and grouped with the other administrative functions.

Another concern expressed by parents, similar to that of the teachers, was about the traffic problem in the bus circulation and drop-off area. The parents also wanted to be assured that the new addition would not harm the site's natural features. In addition, they asked how the money for the project would be allocated, when the pace program would be finalized, and when construction would begin and end. The meeting revealed the parents'concern for many details related to the improvement of the learning environment and uncovered additional issues not discussed in the teacher workshop. Above all, it assured and satisfied the parents that their views were considered important to the design team.

Facility Committee Review

Recommendations resulting from the parents meeting were considered by the architects as they finalized Plan B in preparation for a series of faciltiy planning meetings. To achieve broad community representation, a facility planning group was formed that included the school principal, representatives of Guilford County Schools, several education consultants, a County commissioner, a school board member, a parent representative, and the County program manager.

After a presentation by the design team that identified the issues surrounding the location of the addition and results generated from the teacher workshop and parents meeting, the facility group questioned the accuracy of the architect's budget estimate. Several members thought the proposed plan would exceed the budget, and the architect was asked to reconsider the location of the new addition. In Plan B, the addition was located on the hilly back side of the school rather than on the level area on the front side. The facility planning group thought that construction on the level area would be less expensive. The design team pointed out that the hillside location minimized construction interference with school activities, located classrooms near the media center and multi-purpose areas, and allowed classrooms to directly access outdoor learning areas. The team also demonstrated that the amount of area available for construction on the level area was insufficient to accommodate the classroom addition. It further noted that an addition in this location would be subject to street noise from the adjacent four-lane road. With support from the principal, Plan B was accepted by the facility planning group.

The facility group also addressed the traffic problem, an issue raised

by both teachers and parents. The principal observed that when parents arrived to pick up their children from school, the line of cars extended as far as the corner of High Point Road and Millis Road, creating a dangerous intersection. The design team was asked to develop a master plan for the entire school site since each school experienced serious parking, safety and bus drop-off problems. With the assistance of a traffic consultant, the team identified additional deficiencies such as bus and car conflicts with kitchen service areas, inadequate visitor parking, insufficient drop-off areas, and a lack of covered protection from inclement weather. From these findings, a new traffic plan was developed that relocated parent parking and bus drop-off areas, created covered walkways, and separated vehicular and pedestrian traffic patterns.

Subsequent facility group reviews were held to examine detailed plans for the new addition. After the plans were approved, the architect was instructed to prepare the construction documents, which were subsequently put out for bidding (Figure 12). The lowest bid was slightly over the budget so minor changes were made to building materials and finishes that brought the cost into line but did not alter the basic design. Construction began in the fall of 2001 with completion expected in time for the beginning of school in the fall of 2002 (Figures 13 and 14).

Conclusion

The participatory approach to school design recognizes that the building process should include the knowledge and expertise of all people affected by design decisions. Expertise is not only the domain of architects and engineers but of a school's students, teachers and parents, who have different but equally valid perspectives. Ultimately, the success of any project requires collaborative teamwork, usually among people with diverse expertise. While team members may change throughout the design process, the final design embodies the thought, the challenges, and the successes experienced throughout the project. Involving future users of a building in the design process is effective for gathering information as well as for influencing design decisions that result in better school buildings. Providing opportunities for teachers, students, and parents to be involved in the initial stages of design recognizes the value of their contribution to the design solution. Such an approach helps teachers increase their awareness of how the school building can accommodate their educational aims and enhance student learning. The expertise of the teachers and students–the actual users of the building–combined with the designer's knowledge of how to shape their educational wishes into a building form, helps to create a successful design and foster a positive school community spirit.

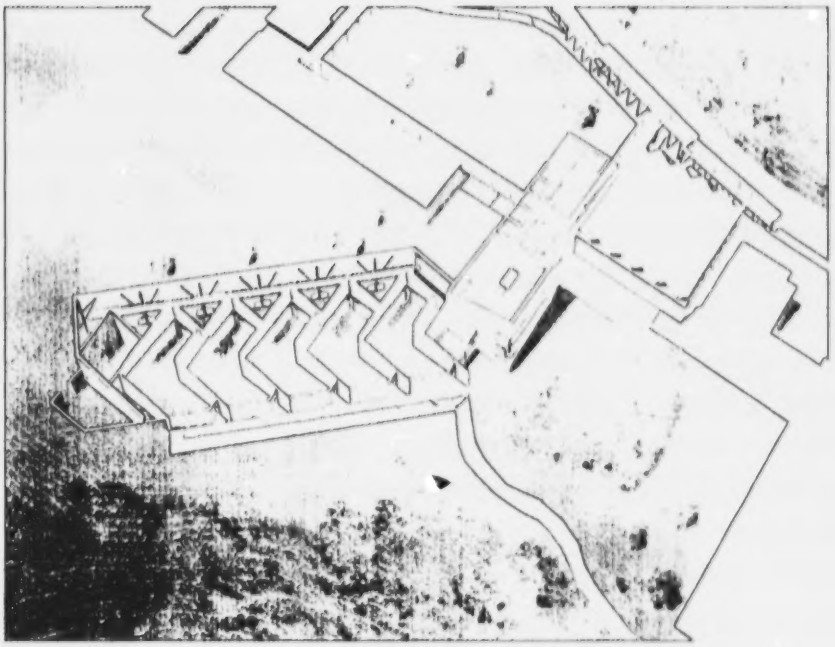

Figure 12: Plan of the new addition (Drawing by Roberto de Leon)

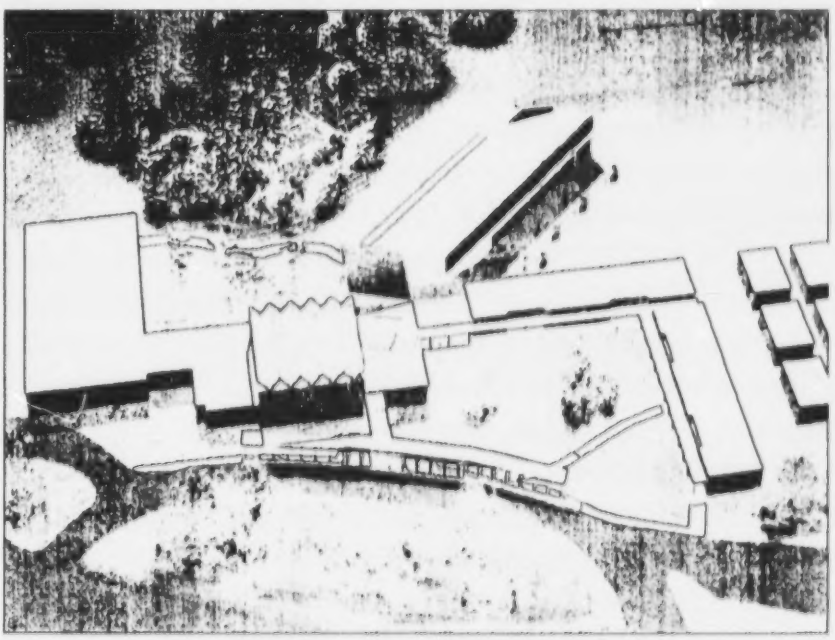

Figure 13: Site plan (Drawing by Roberto de Leon)

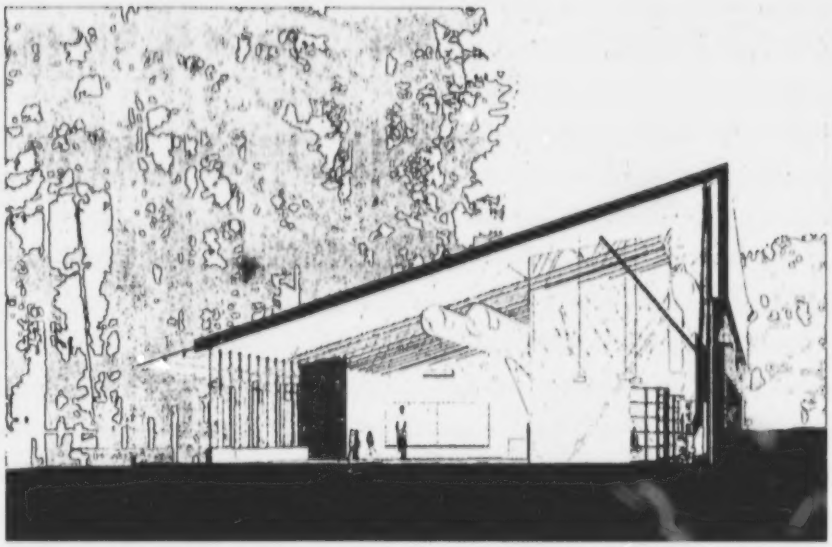

Figure 14: View through a classroom (Drawing by Roberto de Leon)

School as the Center of Community

Overview

Architects
Adams Group Architects

Planning Partner
Henry Sanoff

Post Occupancy Evaluation
Henry Sanoff
Jennifer Hyder
James Rice
Jennifer Killeen

Introduction

Davidson, North Carolina, is a small, active community interested in the functionality and appearance of its school facilities. One result of this interest was that the community passed a bond issue to fund a new 600 student elementary school to replace an outmoded facility. Anticipating their new building, the Davidson teachers organized and began discussing educational changes they hoped to see occur. Recognizing the community spirit and interest in the project, the county school planning administration awarded he contract for the new school to an architectural firm experienced in working effectively with community groups.

Located in North Carolina's Charlotte-Mecklenburg area, the Davidson school district is undergoing an educational reform process that could substantially change how the county's school buildings are designed. As a result of numerous workshops and training programs undertaken by teachers, a climate now exists within the school system that supports team teaching in the county's elementary schools. The growing population and inadequacy of older schools in the area prompted the school administration in 1992 to construct four new elementary schools on four different sites. The Davidson site is the only one containing an existing school building. It is located in a well-organized community and is subject to reviews by an appearance commission, an historic district commission, and an active citizens group. Davidson Elementary School already had a committee structure that examined excellence in education, and it had a group of teachers and parents eager to participate in designing the new school.

The Davidson Elementary School was designed to express teachers' and parents' vision of an appropriate environment for 600 children, kindergarten through 6th grade. Involving the community in the planning and design process was considered instrumental in achieving changes in the traditional school delivery process, which normally bypasses the teachers' expertise and produces a building based on a formula. With Davidson, the new school was also perceived to be a community focal point. One example of this was that the community, working through the PTA, voiced its desire to have a full sized gymnasium, an unusual feature for elementary schools in the region. The gym would provide a community center for the public and a recreation area for the school, and it would be developed in exchange for code-required road improvements provided by the town.

One of the initial activites in this visioning process for the school's design included extensive interviews with teachers at each grade level. Numerous workshops were held in order to identify educational

objectives for different grade levels and the complementary teaching methods for achieving those objectives.

Integrating the expertise of the teachers with findings from the educational literature is believed to be an approach for producing school environments that are relevant and satisfactory for their diverse users.

Another of the initial activities was to have parents, teachers, students, and community members hear about a strategy for involvement from the Davidson Elementary School principal. This was followed by individual interviews with each of the school's thirty teachers to review the educational specifications provided by the town's division of school planning. The specifications identify the required spaces and list necessary classroom equipment for each grade level. The obvious limitation of the 'ed specs' is that they presume a set of educational objectives and a style of teaching. During the interview process, many discrepancies were found between the specifications and the teachers' actual requirements. Examples included the location of teachers' workrooms, location of counselors' offices, and general requirements for proximity between academic and administrative areas. The teachers also discussed teaming, and they voiced a desire to have a design that would help them team and collaborate more effectively. Rather than choosing a design that specified a single work area remote from the clusters of classrooms, the teachers wanted an arrangement that would create several small workrooms adjacent to their classrooms. These spaces would suppport not only teachers' work, but parent tutoring and interactions between parents and teachers. Teachers also noted that the long noisy corridors in their present school might be duplicated in the new school.

In subsequent events, community groups contributed ideas for the school's design. Local artists, volunteering weekly at the school as tutors, wanted the design to include places to exhibit student work and art developed by the local community.

Group Interaction

As ideas are collected that will shape the school's design, there must be a systematic way to organize them all into a coherent plan. The objectives for using the environments must be discussed, considered, and decided upon by the teachers, administrators, and students. The relationship between students activities, places for those activities, and the relationship of those spaces to the learning objectives is the basis for designing. The learning or developmental objectives in the educational literature describe concepts that are paramount to young students' development including personalizing their learning environ-

ment, controlling their own movement, having adequate places to meet and gather, having environments that can accommodate different student activities, and being able to undertake projects and studies in their own areas of interest (Dorman, 1981).

While educators agree that these learning objectives play a crucial role in the development of young adolescents, there is less agreement about exactly how these concepts should be executed in an actual school design. The interpretation and philosophy of an educational program has a significant impact on how the educational objectives are manifest in the learning environment. For example, "personalization of place" is an important objective because, as the educational literature points out, the young adolescent needs to have a stake in his or her environment (Sommer, 1979). An important aspect of personalized space is the presence of designated places where adolescents can safely gather to converse, explore ideas, and engage in stimulating activities. Such places may take the form of outdoor courtyards, outdoor tables and benches, or interior places such as student lounges, or corners of a larger room.

After recording observations and interviewing students and staff, the school community members were ready to consider features of the physical environment through small group discussion sessions that stressed consensus decision making. The process, described as *Relating Objectives for Learning to Education* (Sanoff, 1994), lets parents and teachers discuss ideas, clarify differences, and seek common understanding. The initial discussion was directed towards generating common objectives. The teachers were divided into six small groups of five people each, according to their teaching focus. The exercise entailed having them select objective statements from a prepared list generated from the educational literature. They were asked to make their decisions based on group consensus to insure that all voices were heard in the deliberations. The teachers not only clarified their ideas and intentions about classroom education, but they voiced strong support for creating a school that would have a healthy interaction with the Davidson community.

The ability to link teaching methods to physical settings was a new experience for the teachers, since their teaching methods were always constrained by the existing classroom. The use of photographs depicting various arrangements let participants explore and discuss a wide range of traditional and non-traditional settings supporting various teaching methods. Most importantly, the photographs describe a variety of outdoor settings suggesting the need for a more integrated

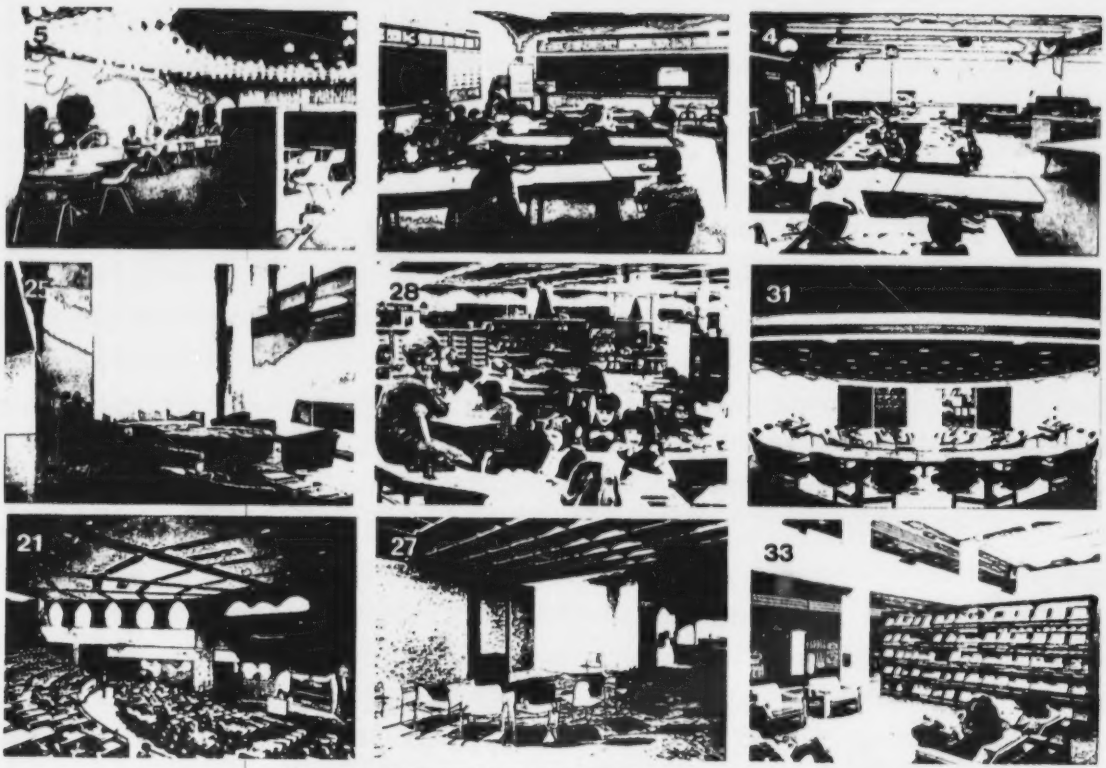

Figure 1: Photographs of learning places

indoor-outdoor environment for learning as shown in Figure 1 (Sanoff, 2001, p.25-26).

This exercise was instrumental in successive interviews with groups of teachers to help them understand how different teaching methods might fulfill variouis learning objectives. Teachers were able to expand the physical characteristics of the ed specs to include the objectives for each grade level, the corresponding experiences planned to achieve those objectives, and the teaching methods that might be employed. This concept helped teachers envision the classroom as a spatial setting that should accommodate a variety of teaching methods.

The opportunity to use the outdoors for a variety of different activities, for small or large group activities, for reading, art, eating, and gardening, expanded the teacher's awareness of opportunities for their new school building. This discovery became manifest in the building design in the form of outdoor areas adjacent to each classroom, covered porches, and courtyard spaces.

Children contributed their perceptions and ideas for the new school's design through art and through poetry. The art teacher and office staff of the project architects met with all the students in the school for two successive days, leading the students through an art exercise where they produced drawings of their ideal school. These included floor plans, sections, and elevations. Images such as towers, clocks, and clerestory windows all appeared in the students' drawings (Figure 2). One idea that emerged from these sessions into the building design was having the media center open to the outdoors. Students also stressed the need for daylight in the classrooms and other spaces. Teachers, parents, and students were asked to write a wish poem stating their desires for their new school, each poem beginning with the phrase, *I wish my school....* shown on Figure 3 (Sanoff, 1994).

Davidson school designed with kids in mind

New

Figure 2: Involvement of students in the generation of ideas for the new school building

Results from each grade, and the parents' and teachers' responses, were summarized and presented on large sheets of newsprint paper. Many of the wishes emphasized teaching methods, particularly team teaching, and an environment that would support innovative teaching methods. There was also an interest in particular physical features, such as an atrium, bright colors, and extensive use of outdoor learning environments. The results of the wish poem, students' drawings, and all subsequent work was exhibited in the school, as an ongoing record of events.

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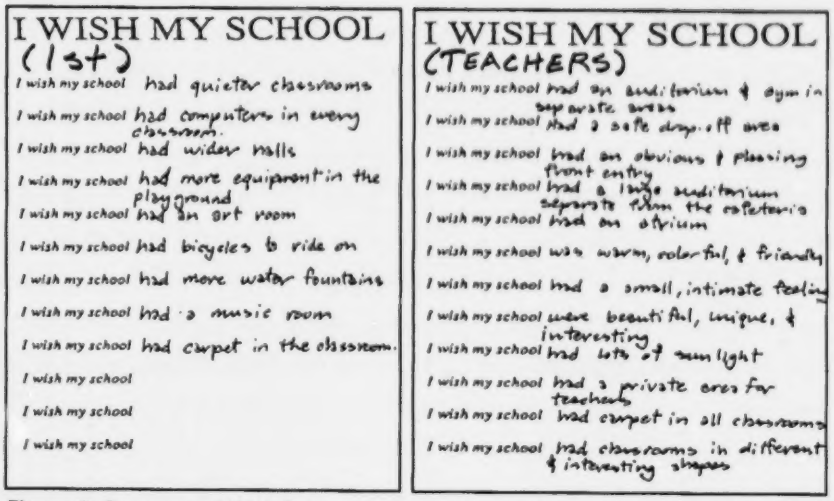
I WISH MY SCHOOL (1st)
I wish my school had quieter classrooms
I wish my school had computers in every classroom.
I wish my school had wider halls
I wish my school had more equipment in the playground
I wish my school had an art room
I wish my school had bicycles to ride on
I wish my school had more water fountains
I wish my school had a music room
I wish my school had carpet in the classroom.
I wish my school
I wish my school
I wish my school
I WISH MY SCHOOL (TEACHERS)
I wish my school had an auditorium & gym in separate areas
I wish my school had a safe drop-off area
I wish my school had an obvious & pleasing front entry
I wish my school had a large auditorium separate from the cafeteria
I wish my school had an atrium
I wish my school was warm, colorful, & friendly
I wish my school had a small, intimate feeling
I wish my school were beautiful, unique, & interesting
I wish my school had lots of sunlight
I wish my school had a private area for teachers
I wish my school had carpet in all classrooms
I wish my school had classrooms in different & interesting shapes

Figure 3: Summary of Wish Poem statements from students and teachers

The final workshop consisted of a building image study and site planning exercise in which 35 teachers, parents, and school-planning officials worked collectively. The building-image study began with a slide show depicting ten different school buildings, each representing different regional characteristics and design features, each intended to expand participants' awareness of variations in the visual character of school buildings. Ratings of each building were used to generate an overall priority list. In effect, the exercise helped participants expand their vision of building images beyond their everyday experiences with school buildings (Figure 4).

In the last exercise of the workshop, a site-planning activity, participants were given a scaled drawing of the new site, (located several blocks from their present school) and scaled building components representing all the spaces in their school building. All building components had labels fastened to pieces of styrofoam. Participants in each of the six groups were asked to develop a building plan located on the site, with consideration given to bus drop-off, parking, soccer field, cluster patterns of classrooms, outdoor space, and appropriate orientation and daylight. At the completion of the two-hour exercise, representatives from each team presented their solution for discussion and debate. The participants (Figure 5) then displayed their solutions for review.

Similarities between solutions occurred in the deliberate use of open space and courtyards, and the clustering of kindergarten, 1st, and 2nd

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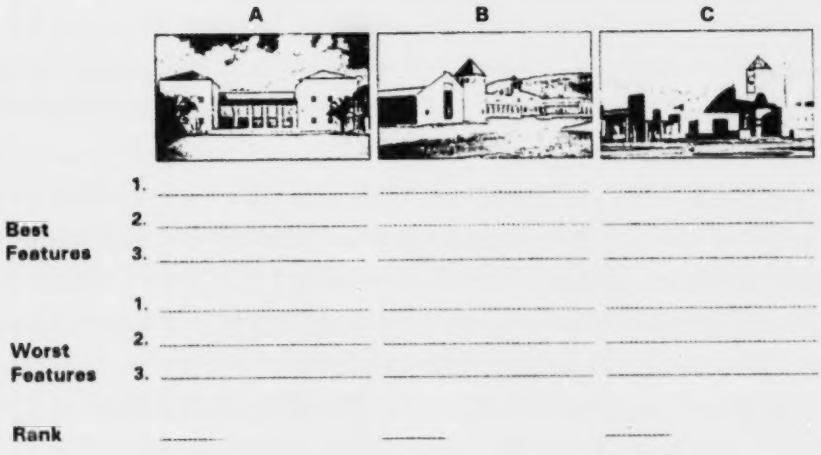


Figure 4: Rating school building images

Figure 5: Parent-teacher workgroups discussing and presenting site plans

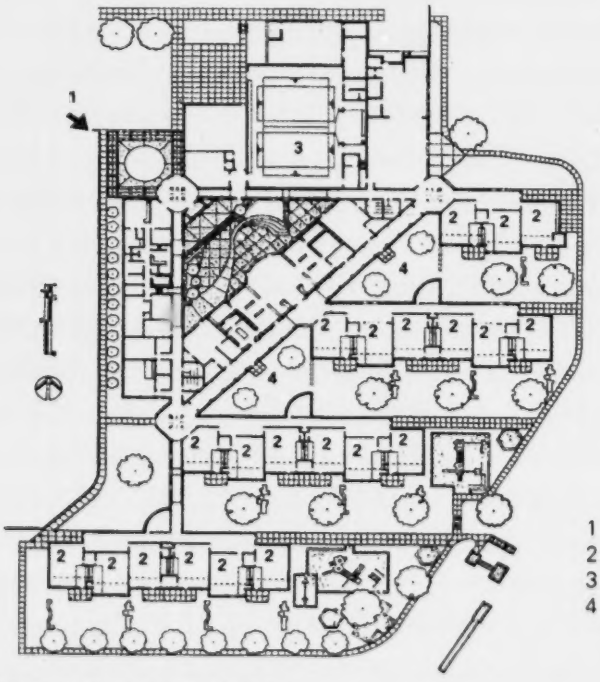
grade classrooms, separated from the 3rd, 4th, and 5th grade classrooms. Team teaching appeared to guide many of these design decisions. While group members expressed some dissatisfaction with their solutions, they all agreed that they came away from the exercise with a better understanding of the complexity of issues requiring simultaneous consideration, and they readily admitted being more sensitive to the role of the architect. They also noted a willingness to let the architect resolve the problems.

The design team met after the workshop to synthesize the results and to produce a solution to meet the requirements developed through the interviews and workshops. One scheme was developed and pro-

posed to the school community by posting large-scale drawings in key locations in the existing school building. Teachers were requested to write their comments about the proposal's positive and negative features directly on the drawings.

After several days of allowing the teachers to discuss and comment on the proposal, the drawings were retrieved and reviewed by the design team. Comments were minor and all the teachers seemed to identify elements of their design ideas in the architect's submission. At this point, and until preliminary drawings were completed, the teachers' involvement was limited to personal interviews clarifying details of classroom design.

The building design contained features atypical of traditional schools in the area, including clustered classrooms to facilitate team teaching and non-graded classes corresponding to the curriculum changes occurring with all Charlotte-Mecklenburg schools, single loaded corridors with classrooms oriented toward the south, and outdoor play areas for each classroom. This design allowed each classroom to have a relatively private outdoor area (Figure 6).



1 Main Entrance
2 Classroom
3 Gymnasium
4 Nature Courtyards

Figure 6: Plan of school building

A plan review conducted by the North Carolina State Department of Public Instruction (NCSDPI) questioned these and other unusual design features, some of which were thought to increase the operating cost of the building.

The Davidson school proposal was different from any other school plan reviewed by NCSDPI. Since the original intention of the project was to create a building that satisfied the needs of the teaching staff and administration as well as the historic concerns of the community, it was agreed to allow the community to make the final decision. A review with the teachers and principal indicated strong support for the cluster arrangement and the opportunity for greater teacher collaboration. The superintendent's office too, supported the building concept and believed it would enhance their curriculum goals.

Citizens of Davidson were equally supportive of the design solution, particularly since they were providing the funds for a gymnasium to be used by the community. The architect commented, "If the teachers and administrators had not been involved in the process, it is clear that the state and county plan reviewers would have been very forceful in making the architects change the plan. It was only the intervention of the teachers and administrators, and the arguments they made for the curriculum, that allowed the slightly higher cost for heating to be overpowered by the gains of the curriculum."

Post-Occupancy Evaluation

Construction was completed on the Davidson Elementary School in January, 1994, at which time students and teachers took occupancy (Figure 7). In May, a research team from North Carolina State University (Hyder & Rice, 1994), using a walkthrough evaluation, systematic observations of classroom and public space behavior, and a student-teacher questionnaire, conducted a post-occupancy evaluation (POE). The thrust of the POE was to validate initial design assumptions about student ownership in the building and its positive effects on their learning. Ownership was operationally linked to students' ability to personalize their environment.

Observations were conducted of children's behavior in eight different classrooms. The results indicated that classrooms of younger children exhibited versatility in seating arrangements, well defined activity areas within the classroom, and continuous use of the adjacent outdoor area. Classrooms of the older children were arranged in such a way that the focus was on the teacher. Interestingly, all classrooms were designed to discourage rows of desks facing the teacher (Figure 8).

MECKLENBURG
NEIGHBORS
SECTION M
The Charlotte Observer
Kids get user-friendly school

Figure 7: The Davidson Elementary School

Thirty-six teachers and sixty students from fourth to sixth grade were surveyed. Both questionnaires focused on the classroom and adjacent areas and how they contributed to the learning process. Distinctions were made between the influences of the teacher and the classroom environment. It was apparent that the teachers' attitude towards education directly influenced the ability of students to personalize their environment. Classroom territory was extended into the hall by the exhibition of student artwork and projects. However, while teachers generally agreed to the importance of providing a variety of workspaces within the classroom to allow for spontaneity of group activity, the students felt that teachers exerted considerable control over their use of the classroom environment. Consequently, personal space was perceived by the student's to be limited to their desk, where individual personalization occured through the use of name tags and desk identification.

Almost all teachers encouraged personalization of the classroom and surrounding areas. To achieve this, bulletin boards within and immediately adjacent to the classroom were used to acknowledge student achievement, promote group identity, and define class territoriality. Teachers were enthusiastic about the way in which the classrooms were designed to facilitate group activities. They also liked the overall building design. Students, too, commented favorably about their new environment.

Satisfaction with the classroom also hinged upon how many students occupied each class. As numbers increased, overcrowding occurred

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Figure 8: Classroom in the Davidson Elementary School

and students reported difficulty concentrating on individual and group work. They also reported that, as classroom size increased, there was a decrease in the likelihood that individual students felt they had a special place in the classroom. However, the students did identify places in the classroom where they preferred to work, which were typically "soft," well defined areas.

Although the students and teachers had occupied the building for only four months prior to the evaluation, it was apparent that the teaching staff needed more time to settle into the building. This additional time would allow teachers to more effectively manipulate the total learning environment to accommodate their educational objectives. Consequently, a walkthrough was conducted two years after occupancy. From this walking tour it was readily apparent that teachers and students had assumed ownership in the building. Soft spaces carved out of the wide circulation spine extended classrooms. Teachers, with the help of students, organized special activity nodes, some of which were furnished with soft, comfortable seating (Figure 9). The enlarged hallway areas were used by lower grades to set up activity zones for small groups and individuals, while the upper grades utilized them as

Figure 9: School interior showing activity nodes

predominantly tutorial or conference space.

Classrooms also had expanded outdoors to include gardens and a variety of student projects. Bold colors accented special places where community artists contributed their paintings and sculpture to the school. The school had become the center of the community.

Sense of Ownership

To determine if the design of the school environment can afford opportunities for enhancing student's sense of ownership in learning, a comparison between two schools was conducted. Both schools are located in the same school district. Davidson school was designed as a community center with gallery areas and wide corridors for the purpose of displaying art (Figure 10). In this school, permanent student ceramic tile displays were installed on the block walls of the school's hallways. The other elementary school was selected to match the same demographic profile and geographic location, and it constructed at the same time with the same design guidelines as the Davidson school, but without the participation of students, teachers and the local community.

Because teaching philosophy may be a factor influencing students' sense of ownership, teacher involvement and control in the classroom was measured by utilizing the Classroom Environment Scale (Moos, 1979). An example statement of involvement is "Very few students take part in class discussions or activities." An example statement of teacher control is "There are very few rules to follow." Comparing sense of ownership between the two schools indicated a significant

Figure 10: Gallery area exhibiting local artists painting and sculpture

effect of the design of the learning environment on students' sense of ownership. After this initial analysis, a further comparison was made between sense of ownership and degree of student work on display. Davidson students, who have more work on display, scored higher on the scale of sense of ownership. A school that has incorporated permanent student artworks into its interior spaces was shown to increase students' sense of ownership in the learning process. Sense of ownership plays an important role in terms of learning engagement and ultimately may even affect student achievement.

Conclusion

The intent of this evaluation was to narrow the gap between what we know about the education of young people through the literature and what we observe happening in everyday school environments. Observations of school buildings and classroom behavior provided insight into space use that often denies the existence of variations in types and styles of learning. Further, buildings produced without the involvement of those who will use them can further exacerbate the rising alienation found in many schools. It is evident that a sense of ownership achieved through participation has far-reaching positive effects, especially when the viability of traditional school building standards and processes are questioned.

Schools within a School

Overview

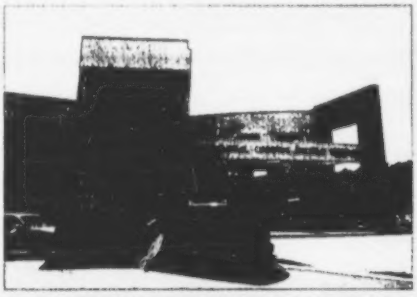
Architects
Boney Architects

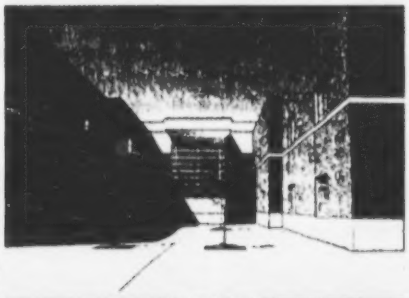
Programming
Henry Sanoff
Ramona Bultman
Jonathan Carr

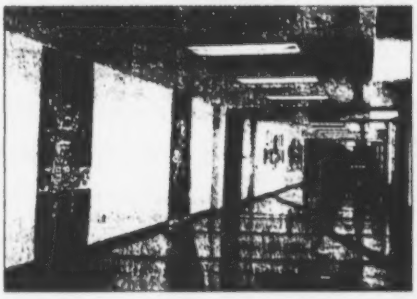
Post Occupancy Evaluation
Henry Sanoff
Celen Pasalar
Deniz Hasirci

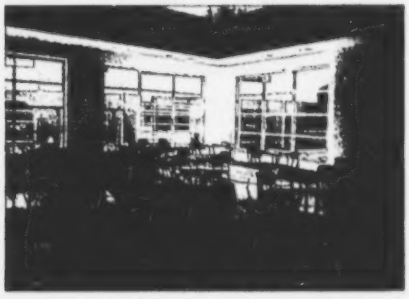
The Centennial Campus Middle School (CCMS) reflects recent efforts to promote small schools. Small, intimate learning communities have been shown to address such problems as reducing the isolation that often seeds alienation; reducing the discrepancies in the achievement gap that affect poorer children; and creating an environment where students are well known and where teachers are encouraged to help students succeed. Centennial school resulted from a lengthy collaborative process between the Wake County Public School System (WCPSS) and North Carolina State University (NCSU). The building is a 600-student middle school that includes three academic houses, each of which functions independently but is under the same principal. Although school construction was completed in 2000, this case study focuses on the stages prior to design development and after building construction. A project goal was creating a building program that responds to a curriculum featuring integrative, active, real-world learning that includes a significant contact with adults. Another important part of the case study is evaluating the completed building from the students' and teachers' viewpoint after one year of occupancy. The post occupancy evaluation (POE) was conducted with a sample of 78 students and 40 teachers.

The Centennial Campus Middle School









History

The Centennial Campus Middle School (CCMS) in Raleigh was 12 years in the making from concept to occupancy. It's the first in the nation to combine the resources of a public school system, a land-grant university, and an advanced research and development community known as the Research Triangle. Located on the 1,200-acre Centennial Campus of North Carolina State University (NCSU), the school constitutes the first phase of collaboration between the university and Wake County's public school system.

The idea of an exemplary middle school developed collaboratively by the Wake County Public School System (WCPSS) and NCSU emerged in 1988 from discussions of the Triangle J Council of Governments. This school, along with the model elementary and high schools planned in Orange and Durham counties, respectively, would give the Triangle Area a full K-12 complement of innovative, exemplary schools. A strong advocate for the middle school was a school board member and the chair of the school board, who was also a member of the NCSU academic community. This key leadership accounted for the continued interest and subsequent approval of the project.

During the next several years, WCPSS and NCSU administrators talked about establishing a middle school and an affiliated teacher development/outreach program on NCSU's Centennial Campus. In 1993, a planning committee was established, composed of approximately 15 WCPSS teachers and administrators and 15 NCSU professors and administrators, predominantly from the College of Education and Psychology. Aided by a small planning grant, the committee was asked to develop an educational program and governance agreement for the school.

The planning committee met as a whole ten times over a two-year period and held a community workshop that was attended by more than 150 people. Its work was augmented by six formal task forces, numerous ad hoc groups, and meetings with key people from community agencies and NCSU.

A joint venture such as this, while beneficial to all in the end, is initially much more complicated than other kinds of projects. Although specialists at NCSU's College of Education envisioned a school where innovative teaching practices and methods would be introduced, it was evident that the traditional architectural model for designing schools was inappropriate. They realized that architectural issues would have to be addressed simultaneously with programming and technological requirements. After several months of intense study and

collaboration, a program was developed that included design elements such as relational diagrams (Figure 1) and recommendations for integrating current teaching practices and emerging technologies (Figure 2). The program required the approval more than 100 specialists, administrators, and educators from the county and the university (Hart, 2001).

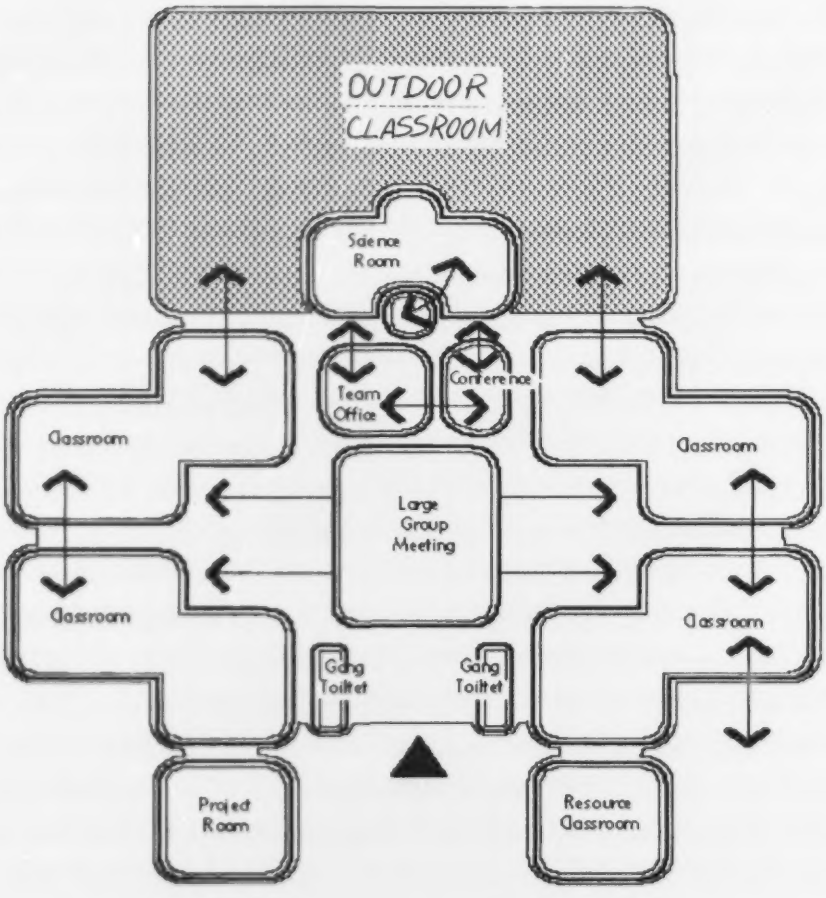


Figure 1: Diagram of the academic house functional relationships

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Centennial Campus Magnet Middle School Project

CLASSROOM 2000 Square Feet

User Information

- Each "double classroom" team will have 2 teachers and 50 students
- Teaching assistants, NC State faculty, students, community professionals, observers, elective teachers, and parents will also use the space periodically

Activity Objectives

- To provide a secure, nurturing environment for students engaged in classroom and outdoor activities
- To provide a place for students to work in small groups and as individuals on school projects
- To facilitate individual research and exploration on state of the art interactive media equipment
- To provide a multi-purpose place for elective teachers to work with students on integrated, curriculum-based projects
- To encourage students' social interaction

Proximity Information

- Classrooms must have direct access to outdoors
- Classroom should be adjacent to science classrooms, multi-purpose spaces and outside areas
- Each House must have ADA accessible toilets located near the entry for student convenience
- Teachers' team planning offices should be directly adjacent to classrooms with a visual connection between both areas
- Students should have direct access to cubby or locker storage areas in the classroom

Design Requirements

- Provide ample wall surface for team presentations
- Create visual separation between learning centers
- Introduce architectural forms that reflect group size and respective activities
- Provide clearly articulated learning centers clustered around large group (25 students) activity space
- Movable partition or dividers may be used to separate classroom into two smaller components
- Provide a water and gas source within each classroom
- Daylighting should provide ample light upon work surfaces
- Provide daylight controls for computers and AV presentations
- Incorporate acoustical treatment to diminish noise transmission within classroom
- Provide area for unobtrusive observation
- Provide clusters of storage cubbies in various parts of the room

Notes

This classroom space is where the students will spend the majority of their school time. It is important that this space meets a variety of functional, aesthetic, social and academic requirements. The classroom space should be flexible enough to accommodate a wide range of teaching methodologies and variant group sizes. Specific learning centers should be identified to determine the classroom layout. The room should be equipped to support a variety of science activities that do not require specialized lab equipment.

Figure 2: Program data sheet describing classroom requirements

The Academic House

Barker & Gump (1964) and Garbarino (1980) have studied the effects of school size. They conclude that small schools offered students greater opportunities to participate and exercise leadership roles. In a comprehensive review of 103 studies of school size, Cotton (1996) noted that students in small schools viewed particular subjects and school in general more positively. Fowler and Walberg (1991) summarized a number of corroborating studies that reported larger schools being more detrimental to student achievement.

The Centennial Campus Middle School is composed of three clusters of approximately 200 students each. Each cluster or "house" contains four teams of 50 students and two teachers. Each of the four teams has its own classroom or learning environment composed of

several learning centers. The creation of identifiable clusters of space that students can call their own is important. Clustering by grade level will give students a strong sense of group identification; grouping students and teachers together into purposefully small interdisciplinary teams reinforces opportunities to develop strong personal relationships. The intent is to allow a sense of closeness to develop between students and teachers that enhances the development of intellectual growth, academic achievement, and emotional and social maturity.

The 50-student core learning environment is intended as a setting for a problem-centered integrated curriculum supported by a team teaching approach. Small teams, working in one large double room, will be overseen by instructors competent in at least two disciplines, such as social studies and science (Figure 3). The interdisciplinary team is a way to bring teachers and students together to establish genuine learning communities. When teachers and students are grouped together in interdisciplinary teams, they create the educational "glue" that holds together almost every other aspect of the school program. The teachers on the team will have joint planning time, all will teach the same students, and all the students on the team will have the same teachers in the basic academic program. Teachers and students also will share the same area of the school and will have the same schedule.

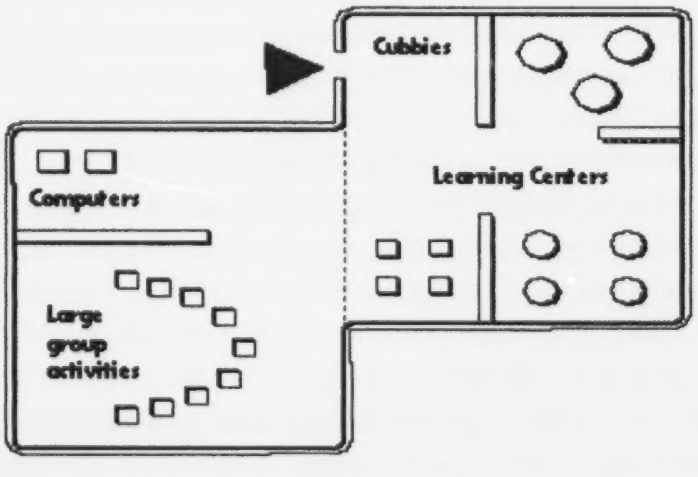


Figure 3: Diagram of 50 student learning environment subdivided into centers

Learning environments, therefore, need to allow for a multitude of teaching and learning strategies. Students should be able to move from independent to cooperative learning. Smaller multi-use spaces will support small-group instruction and group projects.

The school's integrative curriculum proposes to engage students in a variety of issues, themes, and problem solving situations where they draw on knowledge and skills from a variety of disciplines. While much of this work is intended to be facilitated by the two-teacher teams, specialty teachers are intended to work on the projects, engage in discussions, experiment with ideas and concepts, generate dialogs, debate issues, solve problems, create models, plan presentations, or otherwise engage in active learning tasks.

Centennial school will educate a wide range of students with varying degrees of learning and behavioral disorders, but it will not likely be assigned students with severe cognitive or behavioral disorders who require a self-contained classroom. Special education teachers will collaborate to integrate students' educational goals into the regular team and House activities by offering individualized instruction and having exceptional students participate in regular school settings whenever possible.

Special efforts are made to adjust educational programs to match each student's learning styles and capabilities. Resource Rooms in each House support supplemental activities for students experiencing curriculum difficulties. These rooms are large enough to provide a variety of learning centers and instructional techniques. As the exceptional student population changes, administrators and teachers will specifically address the programmatic needs of this special population.

Client Perspective

In late 1995, the firm of Boney Architects was selected to conduct a site comparison of several 18-acre locations within a predetermined 35-acre sector on the Centennial Campus. Within the 18-acre allocation, the school building footprint, its playing fields, parking lots, and school bus pick up and drop off would be included. The limited acreage was due to the high land cost, estimated at $500,000 an acre. Once the site analysis for the school was completed, the project was placed on hold by the WCPSS as it waited for the school bond legislation to pass. WCPSS approved the project in 1997. Both WCPSS and NCSU prepared a list of suitable architects for the project and Boney architects was the first choice from both groups because of their school experience and familiarity with the project. Consequently, they were selected as project architects.

Problems that arose during the intervening year stemmed from the complex arrangement between NCSU and WCPSS over exactly who owned the property. Typically, non-academic buildings on the Centennial Campus were constructed by NCSU and leased to a particular business organization. This arrangement proved to be too costly for WCPSS, so the approach was altered whereby Wake County would build the school and lease the land from the University. Because of the procedural change and limited availability of land for the site, a more compact building was required. An agreement was subsequently reached between NCSU and Wake County for a 50-year lease for the property on which the school sits.

A joint task force was formed to work with the architects, comprised of ten representatives from NCSU and WCPSS that met on a regular basis through the schematic design process. Typically, Wake County Public Schools project management includes two people, one representing planning and programming and the other representing construction management. In this case, other WCPSS staff were included in the review process, such as middle school, fine arts, technology, and media personnel, since this project was more complex than the typical school buildings constructed in the county. Overall, about thirty people were involved in the schematic design review process, including NCSU representatives from campus planning, real estate, and the School of Education.

The shift in ownership of the school from NCSU to the WCPSS created some tension within the client group because of the unique nature of a school based on academic houses. For example, additional staff would be needed for special services and other programmatic functions that WCPSS could not provide, which required reductions in the amount of area allocated to certain functions. Similarly, the architect offered several design alternatives that were supported by the Wake County group but rejected by the university representatives because the solutions deviated from the concept of three independent academic houses. Another controversial issue was related to the concept of a classroom designed for 50 students and two teachers. The original intention was to construct an unobstructed space that could be subdivided into several learning centers, allowing teams of students to engage in different projects simultaneously. The university representatives opted for a movable partition to divide the classroom, but Wake County school officials reported unsuccessful experiences with movable walls and recommended a permanent wall with double doors to allow movement between the two classrooms. Though the solution clearly compromised the intent of team teaching, the wall was built

and the double doors were installed.

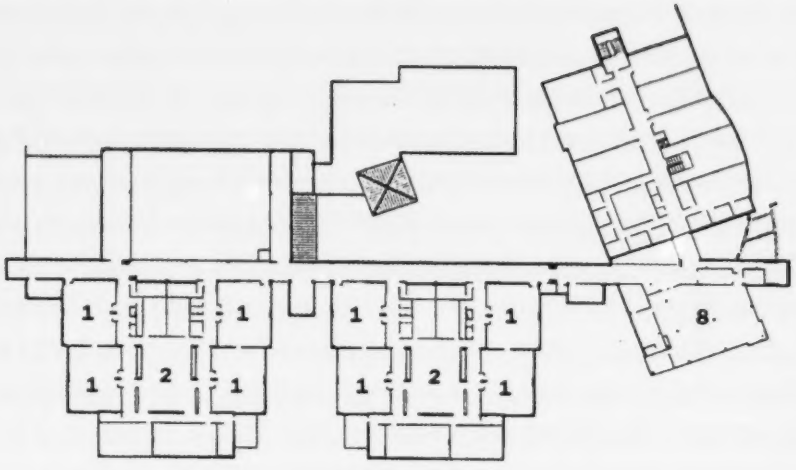
The lack of programmatic clarity between the county and the university task force members often placed the architects in an untenable position. Turnover among task force members meant that many had not been involved in the discussions that had occurred in the years preceding the passage of the school bond. Consequently, the architects were caught in the crossfire between task force members as they debated the interpretation of the original programmatic intentions.

The schematic design of the school with its three academic houses was completed by the Spring of 1997 and approved by the WCPSS, an NCSU review committee, and the Wake County School Board. By the Summer of 1997, the design development drawings were sent for review and approval to the WCPSS, the NCSU review committee, the state department of insurance, and the state office of construction (the unusual event of a county school being constructed on state property involved the state office of construction, which required regular project reviews). The school opened to the students in the Fall of 2000 (Figures 4 and 5).

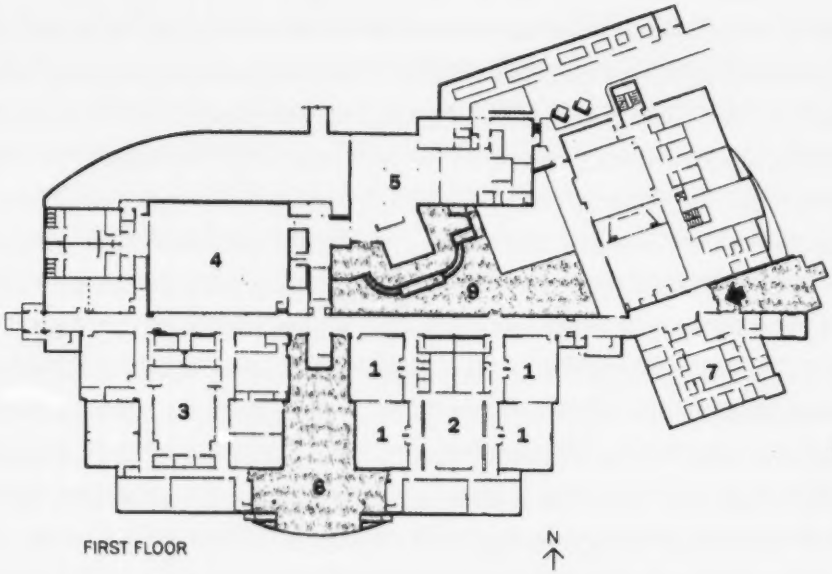
Post Occupancy Evaluation

Academic needs form the basis for a post occupancy evaluation (POE), which is basically a checklist for scoring against an ideal situation and asking questions to determine if the school is fulfilling users' expectations. The POE has many possible uses among school staff, school boards, citizens councils, and parent-teacher organizations for determining school quality and for designing or modifying school buildings. It can be applied to any type or size of school environment. The type of POE utilized for a particular situation is a function of the amount of time available, the resources, and the depth of knowledge necessary.

Prior to initiating a POE for the Centennial school, the client was briefed about the nature of the process, the type of activities involved, and the shared responsibilities for conducting the POE. Background information, such as building documentation and the schools' organizational structure, also was collected. Information gathering and sampling methods were developed, authorization for photographs and surveys was obtained, and data recording sheets were prepared. Observing the building under working conditions for several hours was sufficient to prepare a data collection plan, which included the school building assessment rating scale (Sanoff, 2001), a qualitative survey organized into categories that are essential components nec-



SECOND FLOOR



FIRST FLOOR

1. *Team classrooms*
2. *Group meeting rooms*
3. *Performing arts*
4. *Gymnasium*
5. *Lunchroom*
6. *Outdoor classroom*
7. *Administration*
8. *Media center*

Figure 4: Floor plans of CCMS developed by Boney Architects

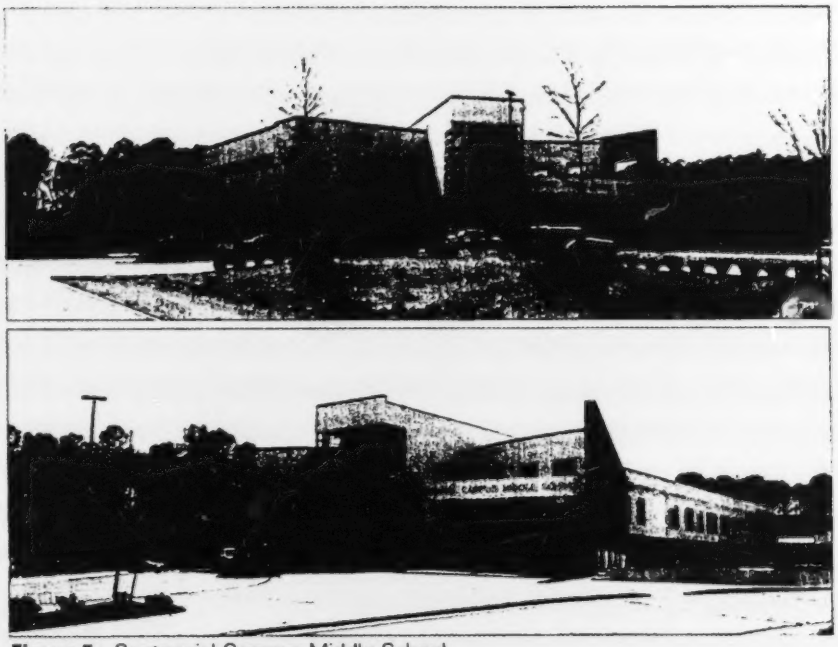


Figure 5: Centennial Campus Middle School

essary for meeting the demands of an optimum learning environment. The components of the rating scale include physical features, outdoor areas, learning environments, social areas, media access, transition spaces, circulation routes, visual appearance, safety and security. Fifty-six statements pertaining to the school building are rated by building users such as students and school staff. The seven-point rating scale is based on a continuum from very unsatisfactory (VU) to very satisfactory (VS), as shown in the Appendix B. Since all the criteria represent qualitative impressions of the school environment, perceptual differences are bound to occur between students and school staff.

The survey sample consisted of an equal number of students from sixth, seventh, and eighth grades totaling 78 completed surveys. All 40 teachers participated in the survey, which was conducted toward the end of the first year of the school's opening.

The survey found that teachers were significantly more satisfied with most aspects of the school building than the students, but the overall impressions of both students and teachers were favorable. Where there were significant differences in perceptions, teachers believed that the learning environments were friendlier than the students did. Teachers, in contrast

to the students, indicated that the classrooms created a stimulating atmosphere for learning. They also felt that there was adequate control of internal and external noise levels to a greater extent than the students did. For teachers, the most satisfactory features of the school were the visual appearance of the exterior and interior of the school building and the harmony of the school building with the surroundings. In general, they felt that it was a safe indoor environment and an appropriate building for learning (Figure 5). The lack of a direct connection from most of the classrooms to the outdoors was cited as a disadvantage, particularly since the building is sited in a forest setting. Private spaces and quiet eating areas for students inside and outside the building were also limited.

Generally, students believed that the Centennial school was an appropriate building for learning. They rated many of the school features, such as visibility of entrances and circulation throughout the building, as satisfactory. Their responses to the instructional areas were positive and they felt safe within the building. They were less positive about the outdoor features of the school, namely street noise, and a

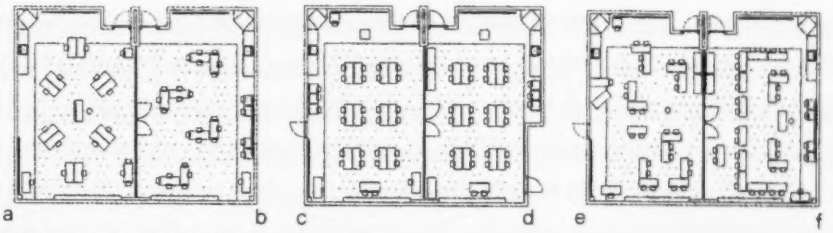


Figure 6: 6th grade classrooms

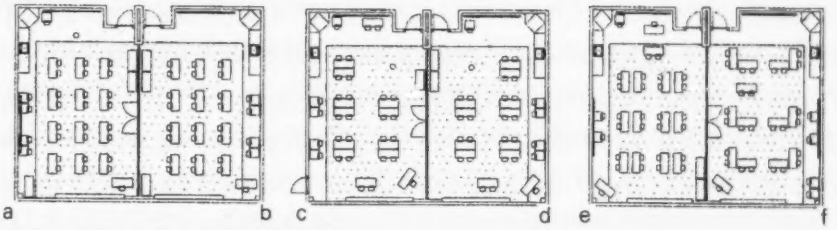


Figure 7: 7th grade classrooms

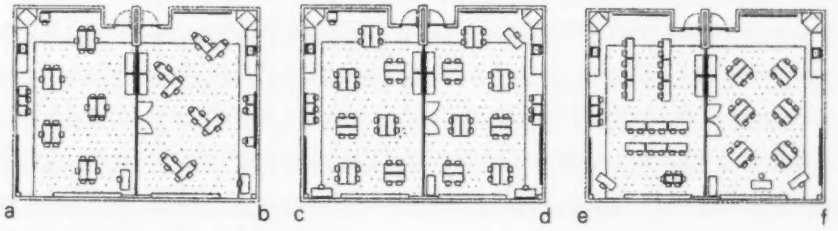


Figure 8: 8th grade classrooms

lack of places for learning and eating. This dissatisfaction can be partially explained by current school policies that restrict students from using outdoor areas. Students, too, would have preferred classrooms to be directly connected to the outdoors, and they commented about the inability to personalize their own place in the classroom. The school building, designed to the scale of children, was less satisfactory for students than for teachers. Finally, the buildings' accessibility for people with disabilities was rated as less satisfactory for students than for teachers.

A number of follow-up interviews were conducted with teachers from each grade level to elaborate on key findings reported from the survey. Teachers felt that the least satisfactory features were classroom-related. Although the original intention as stated in the program was to create an open classroom for 50 students and two teachers, WCPSS decided to create two classrooms separated by double doors, as discussed earlier. The double doors between the classrooms limited student movement since they were frequently closed. The doors were open for a short period of time in the mornings and during team teaching activities, but this decreased as grade levels increased. Classroom seating arrangements were directly related to how frequently the two classrooms shared common activities. The sixth grade classroom seating arrangement typically consisted of table groupings that allowed some visibility between classrooms when doors were open (Figure 6a, b, c). Classsroom seating patterns throughout the school varied to include rows (Figure 7a & b), groups (Figure 6c), and a circle (Figure 6a). The variety in student desk arrangements was a result of the teachers' view of a pedagogically effective layout. Several classrooms were more teacher centered (Figure 6a, 7a & 8c), where they would spend more time at a particular location in the room. Higher teacher mobility was apparent in classrooms shown in Figure 6b, 7f and 8b. Mobility and centeredness influence teacher's movement patterns and how they interact with students in the classroom. Student-centered classrooms are those where there is greater teacher mobility and more interaction with students. The most teacher-centered classrooms have a seating arrangement organized in a circle (Figure 6a).

This display of classroom layouts illustrates how the environment sends different messages that influence students and teachers responses and expectations. From the variety of classroom layouts, it is evident that there are differences in teaching style and that the arranged learning environment can encourage students' interaction and involvement to support the learning process.

Conclusion

To maximize the potential of active integrated learning, students and teachers will need new ways of using time, space, and grouping procedures to explore educational issues. Because young adolescents need a sense of belonging, of feeling part of a group with which they can identify, the academic house allows them to be divided into small, personal units. The two-teacher academic teams with approximately 50 students per team working in one large "double room" was identified as key element in developing the organization and structure for the school. Within the large team, small teams were envisioned to promote close personal relationships, to allow teachers to effectively build upon students interests, strengths and learning styles, and to encourage team planning and more flexible use of time.

The aims of the Centennial school, as stated in the building program, included supporting a variety of student groupings and ways of learning. There was a desire for all rooms to open to the outdoors to encourage their use as extended classrooms; flexible walls and movable furnishings were envisioned to address changes in instructional strategies; and places were envisioned where students could display their work.

The original vision for the Centennial school was not entirely realized. Although the program identifed site requirements for a school building to be constructed on one floor with adjacent outdoor areas for each classroom, high land costs influenced university officials' decision to select a smaller site that dictated a two-story building. This decision denied direct access to outdoor areas for classsrooms located on the second floor. The restricted site limited the creation of special places for outdoor learning activites, a desirable feature identified by many environmental educators.

While the concept of the three academic houses was evident in the design and operation of the school, the internal structure of each house divided into team classrooms was not implemented as originally envisioned. This can be partially explained by the shift of key people at various stages of the planning process. Those individuals responsible for shaping the vision of the school were replaced by a more pragmatic group involved in the implementation of those visionary ideals. Furthermore, the Centennial School teachers were not part of the planning process and were unaware of the documents describing the school's vision.

Accessibility in a Community School

Overview

Architects
Ratcliff Architects
Christie Coffin

Post Occupancy Evaluation
Henry Sanoff

Introduction

The Rosa Parks Elementary School (formerly the Columbus School) is located in an ethnically diverse area of Berkeley, California. Officials declared the school seismically unsafe following the 1989 Loma Prieta earthquake. The Berkeley Unified School District supported the community's vision of creating a model community-oriented urban school. Working closely with the school district, teachers, and community, the architects planned and designed a new K-5 school that provides a pre-school, before- and after-school childcare programs, a learning resource center for students and parents, a science center, and a space for family programs, counseling, and healthcare services.

The Columbus School has been the heart of the West Berkeley community for well more than a half century. The decision to close it after the 1989 earthquake, though a heartbreak, was an opportunity to revitalize the aging center of the community. The participatory process, which included parents, teachers, children, and community members, began well before the school design started. Berkeley citizens initiated and passed a bond measure to rebuild the earthquake-damaged school and organized the Measure A Columbus School Site Committee, a racially and economically diverse group comprising senior citizens, parents, teachers, staff, and neighbors. Central to the vision established by the site committee was that of a community school designed to educate, strengthen families, and build community. The Berkeley Unified School District agreed with this vision and commissioned Ratcliff Architects to work with the community on a plan to remodel the earthquake damaged school. After a structural review, however, it was deemed more cost effective to build a new school.

Community Design Process

Working with the architects, the site committee organized a series of five bilingual workshops to discuss school needs. Neighbors, parents, grandparents, teachers, children, police, and social and health workers came together with district personnel to participate in the design process (Bressi, 2000). The initial workshop consisted of five teams of twelve people each who walked the school site, noting needed changes on a site plan. A location of the new school's entrance was determined unanimously in this workshop. In subsequent workshops, participants placed buildings on a scaled site plan, discussed classroom groupings, and constructed scale models of an ideal classroom (Figure 1). The concepts agreed upon in the workshops were indoor and outdoor teaching spaces, clustered classrooms, and a school that should reflect the residential character of the neighborhood (Figure 2).

A site model submitted and approved by the site committee and the school board included all the major features identified in the work-

Figure 1: Scale model constructed in the workshop

Figure 2: Workshop discussion session

shops, such as classrooms with patios opening onto a courtyard shared by other classrooms (Figure 3). Each courtyard connected to a playground adjacent to an entry courtyard that served as the front door to the community (Figure 4). Classrooms were designed as house-like structures, each sharing a patio and office resource space with the next (Figure 5). The classrooms were grouped in four clusters around courtyards, providing a child-friendly scale and protected play areas for younger children.

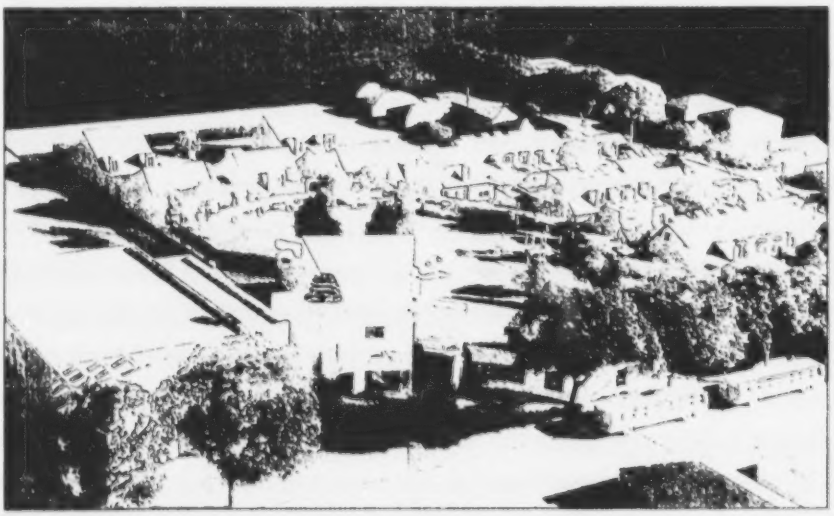


Figure 3: Site model of the Rosa Parks Elementary School project

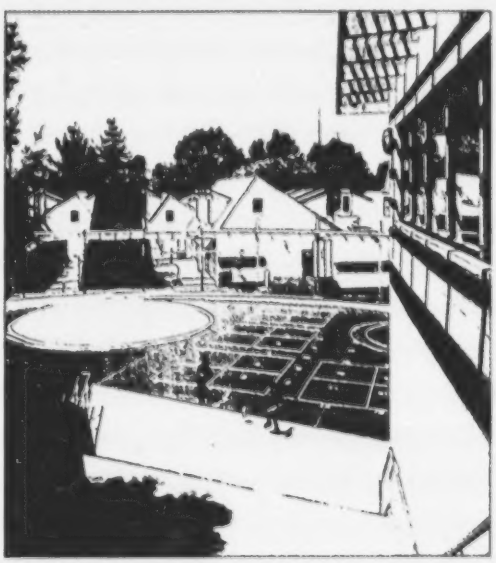


Figure 4: View of playground and adjacent classrooms

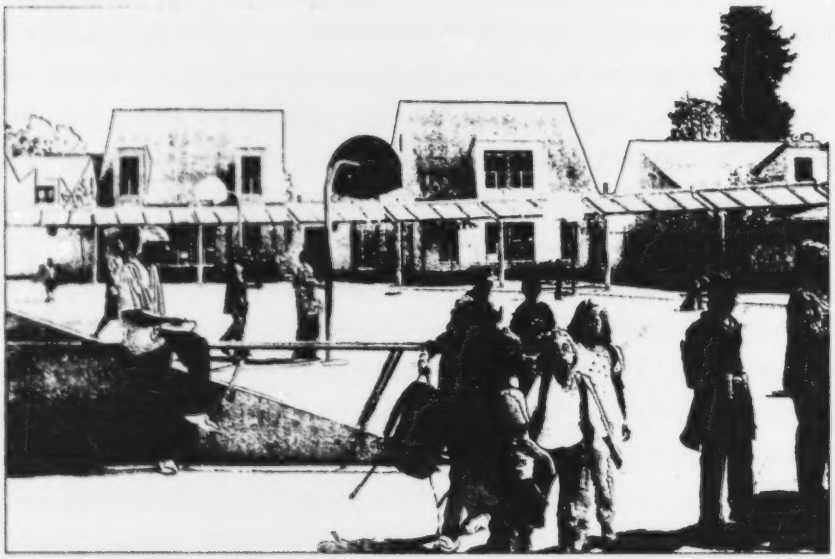


Figure 5: View of house-like classrooms

Inclusive Design Assessment

The group envisioned a community-centered school serving people of all ages and abilities and offering a preschool, activities before and after school, a family resource center, and supervised recreation programs. Although education practice under law requires public schools to open their doors to children with disabilities, school buildings are often unable to accommodate those with learning disabilities or those who suffer from mental, visual, or hearing impairments. Since the Rosa Parks School exemplifies a broad base of community participation, which includes specialists from social and health services, the architects and school principal agreed to a study that measures how well the building satisfies the special needs of its users. These particular measures of satisfaction, referred to as universal or inclusive design, ask from the outset how to make the design work seamlessly for as many people as possible. If a design works well for people with disabilities, it works well for everyone.

To assess the effectiveness of school buildings in meeting the needs of its diverse users, a survey tool was developed based on the principles of inclusive design (Connell, et al, 1997). The principles suggest that a design solution should:

- be useful to people with diverse abilities
- accommodate a wide range of individual preferences and abilities
- be easily understood

- communicate effectively regardless of users' sensory abilities
- minimize hazards
- be efficient and comfortable
- be appropriate for users' body size, posture, and mobility.

The Inclusive School Building Assessment Checklist (Appendix C) consists of nine factors with a series of statements that teachers rate on a scale from very unsatisfactory (VU) to very satisfactory (VS). The factors are:

Building setting. The ease with which people move around the environment.
Information legibility. How signs, shapes, and materials influence the way people understand their environment.
Comfort. The environmental conditions that affect people's comfort.
Safety. The building features that meet people's safety needs.
Wayfinding. The ability of building occupants and visitors to recognize routes, traffic patterns, or passageways in and around the building.
Communication. The way the environment communicates information to people, regardless of their abilities.
Social engagement. How well the environment accommodates diverse human needs and creates opportunities for active participation and inclusion.
Versatility. The way furnishings and equipment aid in achieving an inclusive learning environment.
Imageability. The way overall features of the environment convey the effectiveness of inclusive design.

Twenty teachers and staff members, including the past and present principal, participated in rating 75 items contained in the school building checklist.

Generally, the teachers were satisfied that their school environment accommodated a variety of disabilities, but there were some differences of opinion. Although walkways to and around the buildings were satisfactory for people with different disabilities, some teachers gave unsatisfactory marks to the separation between bus drop-off and car circulation, and entrance visibility from drop-off areas (Figure 6). They also said there was insufficient sheltered seating at bus drop-off areas for people with different physical abilities, although adequate seating was initially provided at those locations.

Most teachers were satisfied with classroom comfort, except for those few who had students who experienced breathing difficulty in carpeted areas, exhibited symptoms of watery eyes after leaving a specific area, or showed sensitivity to new smells–particularly after a

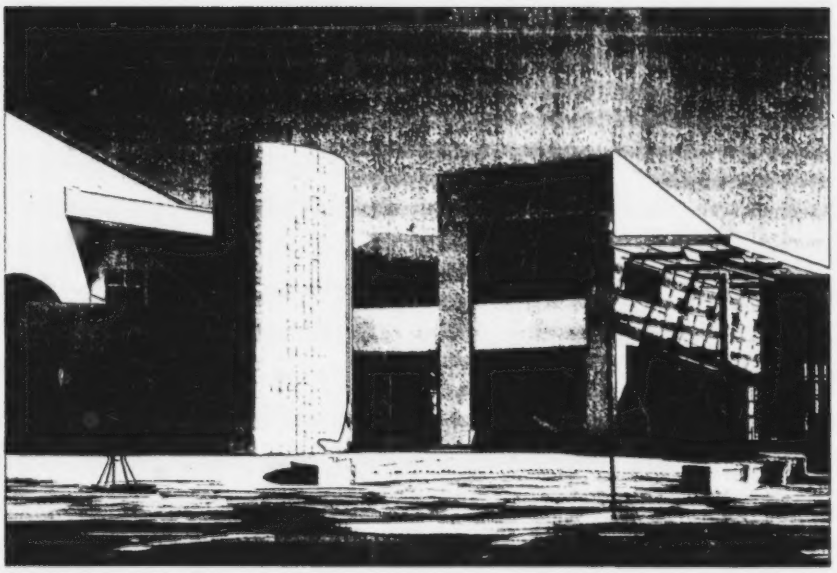


Figure 6: Building entrance from the bus drop-off area

space had been cleaned. Some teachers noted that their year-round temperature control was unsatisfactory, a surprising response, since each classroom had individual heating controls and operable windows for cross ventilation and daylight. This may be due to the inability of a few classrooms to control the warm mid-day sun.

Several teachers noted that students had difficulty accessing teacher's offices, explainable because offices were shared between pairs of classrooms, requiring students to walk through one of the classrooms to access them. Most teachers, however, found the office arrangement beneficial for sharing ideas with their colleagues. For students with visual impairments, teachers commented that circulation routes were not marked or clearly understood, and that there was not an adequate variety of communication means employed in the classroom.

The school environment was deemed successful in creating student participation and inclusion. Teachers agreed that there were places where students could meet informally with friends, Learning spaces functioned well for both small group meetings and places that needed to be quiet. Instructional spaces allowed simultaneous activities to take place and still serve the needs of hearing–impaired students. According to several teachers, however, exhibition space to display student work was inadequate, and furnishings and equipment in

recreation areas were not equipped for the use of all students. Still, the majority of the teachers felt that learning spaces allowed students with disabilities to learn alongside their peers and that the school environment was accessible to all people.

Overall, the teachers believed that the features of the school clearly conveyed the effectiveness of inclusive design. They were able to recognize interior functions, such as classrooms and administration areas, from the outside of the building. The teachers also agreed that the school grounds and building were aesthetically pleasing, making daily activities more pleasant to accomplish and creating a sense of belonging among students.

Conclusion

The Rosa Parks Elementary School was the result of a long, inclusive community planning process that not only fostered the design of a human place, but also had a positive impact on the community. Children and families can take advantage of various community services at the school, including health and counseling services and after-school activities. Community use of the facilities includes a multi-purpose room for public meetings, rehearsals of the Berkeley Symphony Orchestra, and celebrations and performances. The community's collaboration with the architects resulted in a design that fosters community connectedness and the attainment of many positive social goals. The Rosa Parks School won the Places/ EDRA design award for demonstrating the connections between good participation, good design, and good consequences.

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Appendix A

Six Factor School Building Checklist: A Walking Tour

The six factor school building assessment is an approach that allows you to focus on six key elements of building assessment--- **context, massing, interface, wayfinding, social space** and **comfort**. By using a series of checklist questions and a numerical rating scale you can assign a score to each factor being assessed.

On each item below, rate your satisfaction with the overall quality of the building design where:

VU=Very Unsatisfactory **U**=Unsatisfactory **SU**=Somewhat Unsatisfactory **N**=Neither **SS**=Somewhat Satisfactory **S**=Satisfactory **VS**=Very Satisfactory

Factor 1 - Context: The school building's setting

	VU	U	SU	N	SS	S	VS
1- Does the building suit the pattern of the surrounding streets?	☐	☐	☐	☐	☐	☐	☐
2- Does the scale of the building suit the site it sits upon?	☐	☐	☐	☐	☐	☐	☐
3- Does the scale of the building suit the scale of the surrounding buildings?	☐	☐	☐	☐	☐	☐	☐
4- Do the public and private areas relate well to one another?	☐	☐	☐	☐	☐	☐	☐
5- Do the land uses adjacent to the building seem to fit harmoniously with the building?	☐	☐	☐	☐	☐	☐	☐
6- Does the school building and its intended use fit well with the type and uses of adjacent buildings?	☐	☐	☐	☐	☐	☐	☐
7- Does the appearance of the building fit in well with the buildings surrounding it?	☐	☐	☐	☐	☐	☐	☐

Write any comments or concerns that you may have about the way the building suits or fails to suit the context of the surrounding area.

Factor 2 - Massing: Buildings are organized in form into some type of massing. Massing of the parts gives both form and meaning as well as variety to the building.

	VU	U	SU	N	SS	S	VS
1- Viewed from the outside, do the building parts integrate well with each other to form pleasing appearance?	☐	☐	☐	☐	☐	☐	☐
2- Do the subdivided parts of the building appear to have a function that is easy to identify?	☐	☐	☐	☐	☐	☐	☐
3- Is it clear what various parts of the building might mean to visitors?	☐	☐	☐	☐	☐	☐	☐
4- Are the various parts of the building planned carefully in relation to one another and to the characteristics of the site?	☐	☐	☐	☐	☐	☐	☐
5- Does the relationship between the parts of the building make it appear as one unified structure?	☐	☐	☐	☐	☐	☐	☐
6- Does variation in the massing provide interest and variety?	☐	☐	☐	☐	☐	☐	☐

Discuss the subdivision of the building into identifiable parts and how successful the concept of massing has been employed.

Factor 3 - Interface: The interface is the meeting place where the inside of the building connects with the outside.

	VU	U	SU	N	SS	S	VS
1- Does the exterior of the building indicate its interior function(s)?	☐	☐	☐	☐	☐	☐	☐
2- Does the inside of the building connect with the outside of the building?	☐	☐	☐	☐	☐	☐	☐
3- Are the exits and entrances easily accessible?	☐	☐	☐	☐	☐	☐	☐
4- Are the various openings related to thoughtful planning of the interior? (Consider entry of light, view, privacy, noise, heat, glare, atmosphere, etc.)	☐	☐	☐	☐	☐	☐	☐
5- Are the exits appropriate from a safety point of view?	☐	☐	☐	☐	☐	☐	☐
6- How pleasant is the experience when you move from the exterior of the building to the interior by means of the main entrance?	☐	☐	☐	☐	☐	☐	☐
7- How clear are the clues to what is public and what is private?	☐	☐	☐	☐	☐	☐	☐

Write your comments about how well the design of the building has addressed the problem of interface.

_____

_____

Factor 4 - Wayfinding: Wayfinding is the ability for students, teachers, staff and visitors to discern routes, traffic patterns or passageways in and around the building.

	VU	U	SU	N	SS	S	VS
1- Are sufficient routes, pathways, streets and passageways provided to and around the building?	☐	☐	☐	☐	☐	☐	☐
2- Do the routes link the building to the surrounding building or structures?	☐	☐	☐	☐	☐	☐	☐
3- Are the routes arranged to consider busy periods, quiet periods, one-way flows, regular movement patterns, traffic jams?	☐	☐	☐	☐	☐	☐	☐
4- Are there nodes (meeting points) for traffic around the building and what happens there?	☐	☐	☐	☐	☐	☐	☐
5- Are all the circulation routes understandable and convenient?	☐	☐	☐	☐	☐	☐	☐
6- Are all the circulation routes within the building easily understood by newcomers, visitors, and service people?	☐	☐	☐	☐	☐	☐	☐
7- Are the interior circulation routes clearly marked and easily understood?	☐	☐	☐	☐	☐	☐	☐

Write your comments about the clarity of circulation in and around the building.

_____

_____

Factor 5 - Social Space: The ability of the school environment to accommodate diverse human needs.

	VU	U	SU	N	SS	S	VS
1- Does the building suit the students' ability to personalize their workspace?	☐	☐	☐	☐	☐	☐	☐
2- Does the classroom function in relation to other space requirements? (Such as: small group meetings, projects, etc.)	☐	☐	☐	☐	☐	☐	☐
3- Does the classroom allow for needed privacy, or individual pursuits?	☐	☐	☐	☐	☐	☐	☐
4- Does the building arrangement allow for casual contact among students and teachers?	☐	☐	☐	☐	☐	☐	☐
5- Does the building arrangement allow for a centralized area of information exchange?	☐	☐	☐	☐	☐	☐	☐
6- Are there exhibition spaces to display student work?	☐	☐	☐	☐	☐	☐	☐
7- Is the location of teachers' offices accessible?	☐	☐	☐	☐	☐	☐	☐

Write your comments about the building's success in accommodating social needs.

_____

_____

Factor 6 - Comfort: The environmental conditions affecting human comfort

	VU	U	SU	N	SS	S	VS
1- Do the learning spaces in the building suit an individual's thermal comfort?	☐	☐	☐	☐	☐	☐	☐
2- Is there an ability to adjust thermal comfort on an individual basis?	☐	☐	☐	☐	☐	☐	☐
3- Does the light level in the building support learning spaces?	☐	☐	☐	☐	☐	☐	☐
4- Is the noise level in a typical learning space distracting?	☐	☐	☐	☐	☐	☐	☐

Write your comments about the achievement of human comfort in the building.

_____

_____

Write any concluding comments you may have based on your overall assessment of the building.

_____

_____

_____

_____

Appendix B

School Building Rating Scale

For each item listed below, please rate your overall satisfaction with its quality, where:

VU=Very Unsatisfactory **U**=Unsatisfactory **SU**=Somewhat Unsatisfactory **N**=Neither **SS**=Somewhat Satisfactory **S**=Satisfactory **VS**=Very Satisfactory

	VU	U	SU	N	SS	S	VS
Physical Features							
1- Connection between indoor and outdoor areas within the campus	☐	☐	☐	☐	☐	☐	☐
2- Appropriate building for learning	☐	☐	☐	☐	☐	☐	☐
3- Accessibility for people with disabilities	☐	☐	☐	☐	☐	☐	☐
4- Building designed and built to the scale of children	☐	☐	☐	☐	☐	☐	☐
5- Control of internal and external noise level	☐	☐	☐	☐	☐	☐	☐
6- Views and natural light through windows	☐	☐	☐	☐	☐	☐	☐
7- Visibility of main entrance for students and visitors	☐	☐	☐	☐	☐	☐	☐
Outdoor Areas	VU	U	SU	N	SS	S	VS
8- Appropriate outdoor areas for learning	☐	☐	☐	☐	☐	☐	☐
9- Green areas adjacent to the learning environments	☐	☐	☐	☐	☐	☐	☐
10- Outdoor play areas for students	☐	☐	☐	☐	☐	☐	☐
11- Outdoor learning environments with natural elements	☐	☐	☐	☐	☐	☐	☐
12- Outdoor learning environments for social interaction	☐	☐	☐	☐	☐	☐	☐
13- Outdoor learning areas for individual learning styles	☐	☐	☐	☐	☐	☐	☐
Learning Environments	VU	U	SU	N	SS	S	VS
14- Indoor learning areas for individual learning styles	☐	☐	☐	☐	☐	☐	☐
15- Centralized grouping of administration areas	☐	☐	☐	☐	☐	☐	☐
16- Workrooms adjacent to classrooms	☐	☐	☐	☐	☐	☐	☐
17- Areas of instruction for the arts	☐	☐	☐	☐	☐	☐	☐
18- Areas of instruction for sciences	☐	☐	☐	☐	☐	☐	☐
19- Teachers' workspace	☐	☐	☐	☐	☐	☐	☐
20- Comfortable and stress-free classrooms	☐	☐	☐	☐	☐	☐	☐
21- Stimulating classroom atmosphere for learning	☐	☐	☐	☐	☐	☐	☐
22- Size of the learning groups in classrooms	☐	☐	☐	☐	☐	☐	☐
23- Comfortable classroom temperature	☐	☐	☐	☐	☐	☐	☐
24- Indoor air quality in classrooms	☐	☐	☐	☐	☐	☐	☐
25- Adaptability of classrooms to changing uses	☐	☐	☐	☐	☐	☐	☐
26- Lighting quality in classrooms	☐	☐	☐	☐	☐	☐	☐
27- Classrooms directly connected to outdoors	☐	☐	☐	☐	☐	☐	☐
28- Classroom walls conducive to displaying students' work	☐	☐	☐	☐	☐	☐	☐
29- Hallways conducive to displaying student work	☐	☐	☐	☐	☐	☐	☐
Social Areas	VU	U	SU	N	SS	S	VS
30- Inside quiet areas for eating	☐	☐	☐	☐	☐	☐	☐
31- Outside quiet areas for eating	☐	☐	☐	☐	☐	☐	☐
32- Private spaces for students both inside and outside building (reading areas, quiet places, reflection areas, listening areas, etc.)	☐	☐	☐	☐	☐	☐	☐
33- Places where students can be noisy and engage in physical activity	☐	☐	☐	☐	☐	☐	☐
34- Public areas fostering a sense of community	☐	☐	☐	☐	☐	☐	☐
35- Students personalizing their own places	☐	☐	☐	☐	☐	☐	☐

Media Access

	VU	U	SU	N	SS	S	VS
36- Media and technology access for students in the learning environments	☐	☐	☐	☐	☐	☐	☐
37- Media and technology access for teachers in the learning environments	☐	☐	☐	☐	☐	☐	☐
38- Communications access in the learning environments (phones)	☐	☐	☐	☐	☐	☐	☐

Transition Spaces and Circulation Routes

	VU	U	SU	N	SS	S	VS
39- Circulation routes within and among learning environments	☐	☐	☐	☐	☐	☐	☐
40- Hallways as passageways within the school	☐	☐	☐	☐	☐	☐	☐
41- Clear markings for interior circulation routes	☐	☐	☐	☐	☐	☐	☐
42- Transition spaces inside and outside of the learning environments	☐	☐	☐	☐	☐	☐	☐
43- Covered pathways among buildings within the campus	☐	☐	☐	☐	☐	☐	☐

Visual Appearance

	VU	U	SU	N	SS	S	VS
44- Visual appearance of the exterior of the school building	☐	☐	☐	☐	☐	☐	☐
45- Visual appearance of the interior of the school building	☐	☐	☐	☐	☐	☐	☐
46- Harmony of the school building with surroundings	☐	☐	☐	☐	☐	☐	☐
47- Variation of ceiling heights within the school for comfort and intimacy	☐	☐	☐	☐	☐	☐	☐
48- Visual stimulation of the school building	☐	☐	☐	☐	☐	☐	☐

Degree of Safety and Security

	VU	U	SU	N	SS	S	VS
49- Safe location of learning environments; free of non-pedestrian traffic	☐	☐	☐	☐	☐	☐	☐
50- Safe indoor environments for students to learn	☐	☐	☐	☐	☐	☐	☐
51- Safe outdoor environments for students to learn	☐	☐	☐	☐	☐	☐	☐
52- Secured storage spaces for students	☐	☐	☐	☐	☐	☐	☐
53- Secured storage spaces for teachers	☐	☐	☐	☐	☐	☐	☐
54- Places designed for personal items of each student	☐	☐	☐	☐	☐	☐	☐

Overall Impression

	VU	U	SU	N	SS	S	VS
55- Student friendly learning environments	☐	☐	☐	☐	☐	☐	☐
56- Teacher friendly learning environments	☐	☐	☐	☐	☐	☐	☐
57- Other (Specify) _____	☐	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐	☐

Personal Information

58- Now we want to know a little bit about you. What is:

a) Your position? (Check the one that applies)

- ☐ Faculty
- ☐ Staff
- ☐ Student

b) Your Sex: ☐ Male ☐ Female

c) No. of years with the present school: _____

Appendix C

Inclusive School Building Assessment Checklist

The school building assessment checklist focuses on eight key characteristics – **building setting, information legibility, comfort, safety, wayfinding, communication, social engagement, versatility, and imageability**. On each item below, rate your satisfaction with the overall quality of the school building where:

VU=Very Unsatisfactory **U**=Unsatisfactory **SU**=Somewhat Unsatisfactory **N**=Neither **SS**=Somewhat Satisfactory **S**=Satisfactory **VS**=Very Satisfactory

Factor 1 - Building Setting: *The building setting influences the ease with which people move around in the environment.*

	VU	U	SU	N	SS	S	VS
1. Are there accessible walkways that connect the building to surrounding streets and buildings?	☐	☐	☐	☐	☐	☐	☐
2. Are walkways, bus circulation, car circulation, service delivery and parking physically separated?	☐	☐	☐	☐	☐	☐	☐
3. Is there sufficient room for vehicles to drop off and pick up students and other vehicles to drive through?	☐	☐	☐	☐	☐	☐	☐
4. Do boarding areas at bus stops offer accessible walkways leading to the building?	☐	☐	☐	☐	☐	☐	☐
5. Are walkways from drop-off points accessible to people with disabilities during bad weather?	☐	☐	☐	☐	☐	☐	☐
6. Are there sheltered places to sit at transportation areas for people of different sizes and with different physical abilities?	☐	☐	☐	☐	☐	☐	☐
7. Are there places where students can rest along walkways?	☐	☐	☐	☐	☐	☐	☐

Factor 2 - Information Legibility: *Signs, shapes and materials influence how well people understand their environment.*

	VU	U	SU	N	SS	S	VS
1. Are building entrances visible from all drop-off areas?	☐	☐	☐	☐	☐	☐	☐
2. Is the main entrance easily identified?	☐	☐	☐	☐	☐	☐	☐
3. How easy is it to recognize interior functions (such as administration, recreation, classrooms etc.) from the outside of the building?	☐	☐	☐	☐	☐	☐	☐
4. Are people able to move through entrances and exits without difficulty?	☐	☐	☐	☐	☐	☐	☐
5. Are routes between buildings designed so students have enough time to get from one class to another?	☐	☐	☐	☐	☐	☐	☐
6. Once inside the building how easy is it to differentiate public spaces from private spaces?	☐	☐	☐	☐	☐	☐	☐
7. Are there multiple types of signs (tactile and visual) and route markers to help students find their destinations?	☐	☐	☐	☐	☐	☐	☐
8. Do route surface textures change to indicate entrances or intersections?	☐	☐	☐	☐	☐	☐	☐

Factor 3 - Comfort: *The environmental conditions affect people's comfort.*

	VU	U	SU	N	SS	S	VS
1. Are temperatures in the learning spaces comfortable year around?	☐	☐	☐	☐	☐	☐	☐
2. Can temperature controls be adjusted in individual learning spaces?	☐	☐	☐	☐	☐	☐	☐
3. Is the light level in the learning spaces sufficient for reading without being overly bright or glaring?	☐	☐	☐	☐	☐	☐	☐
4. Do students experience eye fatigue at the end of the day?	☐	☐	☐	☐	☐	☐	☐
5. Do students find the noise level in a typical learning space distracting?	☐	☐	☐	☐	☐	☐	☐
6. Does the building allow for ample fresh, clean air (no vehicle exhaust, lab fumes, chemical irritants or other contaminants)?	☐	☐	☐	☐	☐	☐	☐
7. Do students notice a "new smell" in any areas of the school?	☐	☐	☐	☐	☐	☐	☐
8. Do students experience symptoms such as watery eyes, headache or nausea that go away after leaving a specific area or building?	☐	☐	☐	☐	☐	☐	☐
9. Do students experience symptoms such as headache, nausea, or difficulty breathing immediately after a space has been cleaned?	☐	☐	☐	☐	☐	☐	☐
10. Do students experience symptoms such as coughing or difficulty breathing in carpeted areas?	☐	☐	☐	☐	☐	☐	☐

Factor 4 - Safety: *The building features that ensure the safety needs of people.*

	VU	U	SU	N	SS	S	VS
1. Is the building equipped so that people with varying abilities can recognize an emergency?	☐	☐	☐	☐	☐	☐	☐
2. Do all warning signals provide visual as well as audible cues?	☐	☐	☐	☐	☐	☐	☐
3. In the event of an emergency are there available means of exiting the building quickly?	☐	☐	☐	☐	☐	☐	☐
4. In an emergency are there areas of safe haven where assitance can be called if needed?	☐	☐	☐	☐	☐	☐	☐
5. Are floor surfaces safe for people with mobility impairments?	☐	☐	☐	☐	☐	☐	☐
6. Do students with mobility problems or in wheelchairs easily traverse playground surfaces?	☐	☐	☐	☐	☐	☐	☐
7. Does the interaction between lighting, flooring and other surfaces avoid glare?	☐	☐	☐	☐	☐	☐	☐
8. Are people with visual and auditory disabilities adequately protected from hazardous areas?	☐	☐	☐	☐	☐	☐	☐
9. Do stairwells and stair treads offer safe passage for people with visual impairments?	☐	☐	☐	☐	☐	☐	☐

Factor 5 - Wayfinding: *The ability for students, teachers, staff and visitors to recognize routes, traffic patterns or passageways in and around the building.*

	VU	U	SU	N	SS	S	VS
1. Are sufficient routes provided to and around the building?	☐	☐	☐	☐	☐	☐	☐
2. Upon entering the building can visitors clearly understand where to go for information?	☐	☐	☐	☐	☐	☐	☐
3. Are all the circulation routes within the building clearly marked and easily understood?	☐	☐	☐	☐	☐	☐	☐
4. Do the directional signs use colors, shapes, raised letters, or Braille so that people with visual impairments can find their way around the building?	☐	☐	☐	☐	☐	☐	☐
5. Do signs use the same colors, symbols, and shapes consistently throughout the school?	☐	☐	☐	☐	☐	☐	☐
6. Have distances to frequently used destinations such as lockers or toilets, been minimized?	☐	☐	☐	☐	☐	☐	☐
7. Are teachers' offices easily located and accessible to students?	☐	☐	☐	☐	☐	☐	☐

Factor 6 - Communication: *The physical environment communicates information to people regardless of their abilities.*

	VU	U	SU	N	SS	S	VS
1. Are learning spaces free from visual distractions?	☐	☐	☐	☐	☐	☐	☐
2. Are noise levels in the learning spaces at a level that allows students to clearly understand what is being said?	☐	☐	☐	☐	☐	☐	☐
3. Are students able to clearly understand messages broadcast through the public address system?	☐	☐	☐	☐	☐	☐	☐
4. Are students able to understand televised programming in the learning spaces?	☐	☐	☐	☐	☐	☐	☐
5. Are instructional spaces designed to allow simultaneous activities to take place and still serve the needs of hearing impaired students?	☐	☐	☐	☐	☐	☐	☐
6. Are there an adequate variety of communication methods for visually impaired students?	☐	☐	☐	☐	☐	☐	☐

Factor 7 - Social Engagement: *The school environment accommodates diverse human needs and allows opportunities for active participation and inclusion.*

	VU	U	SU	N	SS	S	VS
1. Do the learning spaces support the students' ability to personalize their workspace?	☐	☐	☐	☐	☐	☐	☐
2. Do the learning spaces function for small group meetings and quiet spaces?	☐	☐	☐	☐	☐	☐	☐
3. Do the learning spaces allow for individual pursuits?	☐	☐	☐	☐	☐	☐	☐
4. Are there places where students can informally meet with friends and teachers?	☐	☐	☐	☐	☐	☐	☐
5. Does the building have a central area where students can exchange information?	☐	☐	☐	☐	☐	☐	☐
6. Are there exhibition spaces that allow all students to display their work?	☐	☐	☐	☐	☐	☐	☐
7. Are students able to fully participate in outdoor activities?	☐	☐	☐	☐	☐	☐	☐
8. Does the cafeteria seating accommodate students of all abilities and sizes?	☐	☐	☐	☐	☐	☐	☐
9. Do cafeteria service areas allow all students to see what is being served?	☐	☐	☐	☐	☐	☐	☐
10. Do all students regardless of individual abilities or size easily use all food services areas (snack bars, vending machines)?	☐	☐	☐	☐	☐	☐	☐

Factor 8 - Versatility: *Furnishings and equipment aid in achieving an inclusive learning environment.*

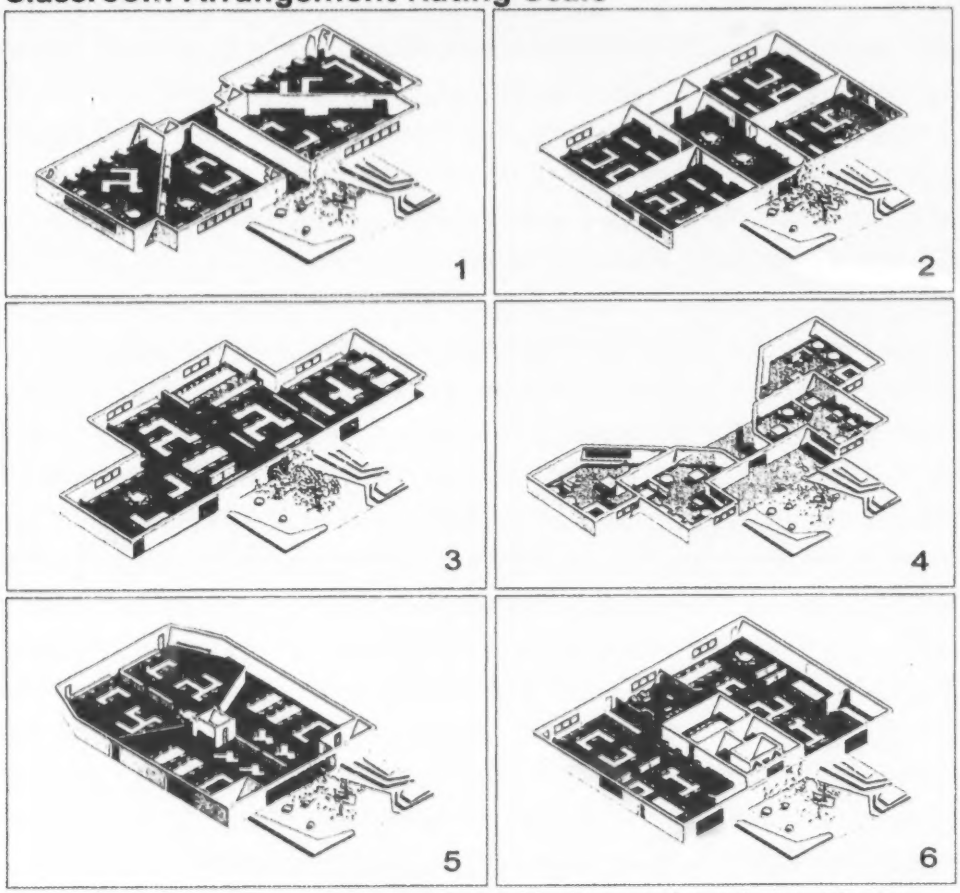
	VU	U	SU	N	SS	S	VS
1. Are there enough tables and chairs of varying heights and sizes to accommodate each student's individual needs?	☐	☐	☐	☐	☐	☐	☐
2. Do work surfaces and equipment surfaces provide a range of choice (desk height, sink height, counter height, adequate clearance, chairs with right or left writing surfaces etc.)?	☐	☐	☐	☐	☐	☐	☐
3. Do work surfaces, equipment, tables and chairs provide a variety of adjustments to comfortably suit individual needs?	☐	☐	☐	☐	☐	☐	☐
4. Are recreational facilities equipped so all students can use them?	☐	☐	☐	☐	☐	☐	☐
5. Is electronic equipment usable by all students?	☐	☐	☐	☐	☐	☐	☐
6. Is computer software usable by all students?	☐	☐	☐	☐	☐	☐	☐
7. Do fitness facilities (gym, weight room, pool, etc.) accommdate use by all students?	☐	☐	☐	☐	☐	☐	☐
8. Do learning spaces provide accessible workstations?	☐	☐	☐	☐	☐	☐	☐
9. Are accessible workstations interspersed among non-accessble workstations?	☐	☐	☐	☐	☐	☐	☐
10. Is accessible seating in the auditorium, lecture halls, and sports facilities located in convenient places?	☐	☐	☐	☐	☐	☐	☐

Factor 9 - Imageability: *Overall features of the school environment can convey the effectiveness of inclusive design.*

	VU	U	SU	N	SS	S	VS
1. Does the school environment make daily activities more pleasant to accomplish?	☐	☐	☐	☐	☐	☐	☐
2. Does the school environment help students to feel a sense of belonging?	☐	☐	☐	☐	☐	☐	☐
3. Do features of the school encourage students to spend more time with others?	☐	☐	☐	☐	☐	☐	☐
4. Do features of the school encourage students to participate in varied activities?	☐	☐	☐	☐	☐	☐	☐
5. Do learning spaces avoid separating students with disabilities from their peers?	☐	☐	☐	☐	☐	☐	☐
6. Do features of the school give students more confidence in their abilities?	☐	☐	☐	☐	☐	☐	☐
7. How satisfied are students with the overall school environment?	☐	☐	☐	☐	☐	☐	☐
8. How satisfied are teachers and staff with the overall school environment?	☐	☐	☐	☐	☐	☐	☐
9. How aesthetically pleasing is the overall appearance of the school grounds and building?	☐	☐	☐	☐	☐	☐	☐
10. Is the entire school building easily accessible to all people?	☐	☐	☐	☐	☐	☐	☐

Appendix D

Classroom Arrangement Rating Scale



Please select the best classroom arrangement that would satisfy each of the following statements:

	1	2	3	4	5	6
1- Students have some opportunities to move around	☐	☐	☐	☐	☐	☐
2- Students can engage in activities, manipulating objects and materials	☐	☐	☐	☐	☐	☐
3- Seating arrangements vary, including small groups, pairs, individuals and total group	☐	☐	☐	☐	☐	☐
4- Individual students and small groups can chose from alternative learning activities	☐	☐	☐	☐	☐	☐
5- Small groups of students can work independently on projects or assignments	☐	☐	☐	☐	☐	☐
6- A variety of teaching methods can be used by teachers	☐	☐	☐	☐	☐	☐
7- Team teaching is easily facilitated	☐	☐	☐	☐	☐	☐
8- Teachers can make quick, clear transitions from one activity to another	☐	☐	☐	☐	☐	☐
9- Teachers can move around the classroom interacting with indiduals and groups	☐	☐	☐	☐	☐	☐
10- Students have a sense of identity and belonging	☐	☐	☐	☐	☐	☐
11- Circulation is minimized	☐	☐	☐	☐	☐	☐

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